



FEASIBILITY OF BOATING ACCESS  
DEVELOPMENT ON LAKE ERIE,  
NORTH EAST TWP., ERIE COUNTY

Conducted as part of the implementation of the  
PENNSYLVANIA COASTAL ZONE MANAGEMENT PROGRAM

December 1983

PREPARED FOR:

The Department of Environmental  
Resources, Division of Coastal Zone  
Management

and

The Pennsylvania Fish Commission

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Pennsylvania Fish Commission  
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### Acknowledgements

This feasibility study is a cooperative effort between the Pennsylvania Department of Environmental Resources, Division of Coastal Zone Management and the Pennsylvania Fish Commission.

The Pennsylvania Fish Commission gratefully acknowledges the input and help of the following: the concerned public, North East Recreation Commission, North East Township Supervisors, Pennsylvania Department of Environmental Resources, the United States Army Corp of Engineers, Buffalo District and Pennsylvania Historical and Museum Commission.

## Introduction

In 1972 the Congress of the United States enacted the Coastal Zone Management Act (PL 92-583). In 1974 Pennsylvania designated the Department of Environmental Resources as the lead agency for Pennsylvania's Coastal Zone Management Program.

Pennsylvania is a qualified coastal state because of its two shorelines, the 55 mile Delaware River Estuary, and the 63 mile Lake Erie Shoreline.

The purpose of the Coastal Zone Management Act is to:

1. Preserve, protect, develop, and where possible, restore our coastal resources.
2. Help states manage their coastal resources wisely through the development of appropriate management programs.
3. Encourage all Federal agencies engaged in work affecting coastal areas to consult closely with the State agencies responsible for administering the coastal management programs.
4. Encourage cooperation among local, State, and regional agencies.

The Commonwealth of Pennsylvania Coastal Zone Management Program and Final Environmental Impact Statement spells out a comprehensive management program for the Pennsylvania coastal resources. It also shows this study site to be in an area of significant natural value.

Since the Pennsylvania Fish Commission is responsible for maintaining and improving the quality of fishing and boating in Pennsylvania, the Commission has proposed this study to

determine the feasibility of providing improved fishing and boating access to Lake Erie in North East Township, Erie County under the Coastal Zone Management Program.



Summary .

Public fishing and boating access to Lake Erie east of the City of Erie to the New York State border is severely limited. Private ownership of most of this 20 mile shoreline and the natural bluffs limit the number of access areas available in this area of the coastal zone. However, a small tract of land located in North East Township, Erie County, owned by the Pennsylvania Fish Commission is being utilized for limited public access and has been identified as having a potential for much greater use. Redevelopment of this site could significantly increase the public boating and fishing opportunities in this portion of Lake Erie.

A recent CZM funded study shows that public boating demands on Lake Erie are high (Young and Lahr, 1982). Fishing pressure on Lake Erie has also increased dramatically with the improvements in water quality and in development of an active trout and salmon stocking program. While the existing access facilities provide limited but significant recreational opportunities, they are not adequate to meet the demand for recreational boating and fishing access to Lake Erie Waters.

This study defines the site and examines options and alternatives for site redevelopment. The chosen redevelopment alternative is both desirable and feasible, provided that sources of funding become available.

The redevelopment concept proposed will provide adequate parking as well as safe shelter, launching and retrieval for small boats. The site improvements could be phased and the

initial investment of \$1,905,625.00 for facilities including a breakwater, boat ramps, parking, service roads, comfort stations and landscaping could provide most of the desired benefits.

This feasibility study indicates that redevelopment of this site would result in a significant benefit to the fishing and boating public, particularly those users residing close to the eastern shore of Lake Erie. Specific benefits to be realized are:

1. Safe and more convenient boat launching and retrieval will be realized.
2. More boaters and anglers can be accommodated.
3. More parking will be provided.
4. Boating distance will be reduced for anglers to their favorite and productive fishing areas located near the site. This also represents an important additional safety consideration, as it greatly reduces the time required for a boater to remove his boat from the lake when sudden storms occur.
5. Driving distances will be greatly reduced for many Lake Erie recreational users.

## Description of the Study Area

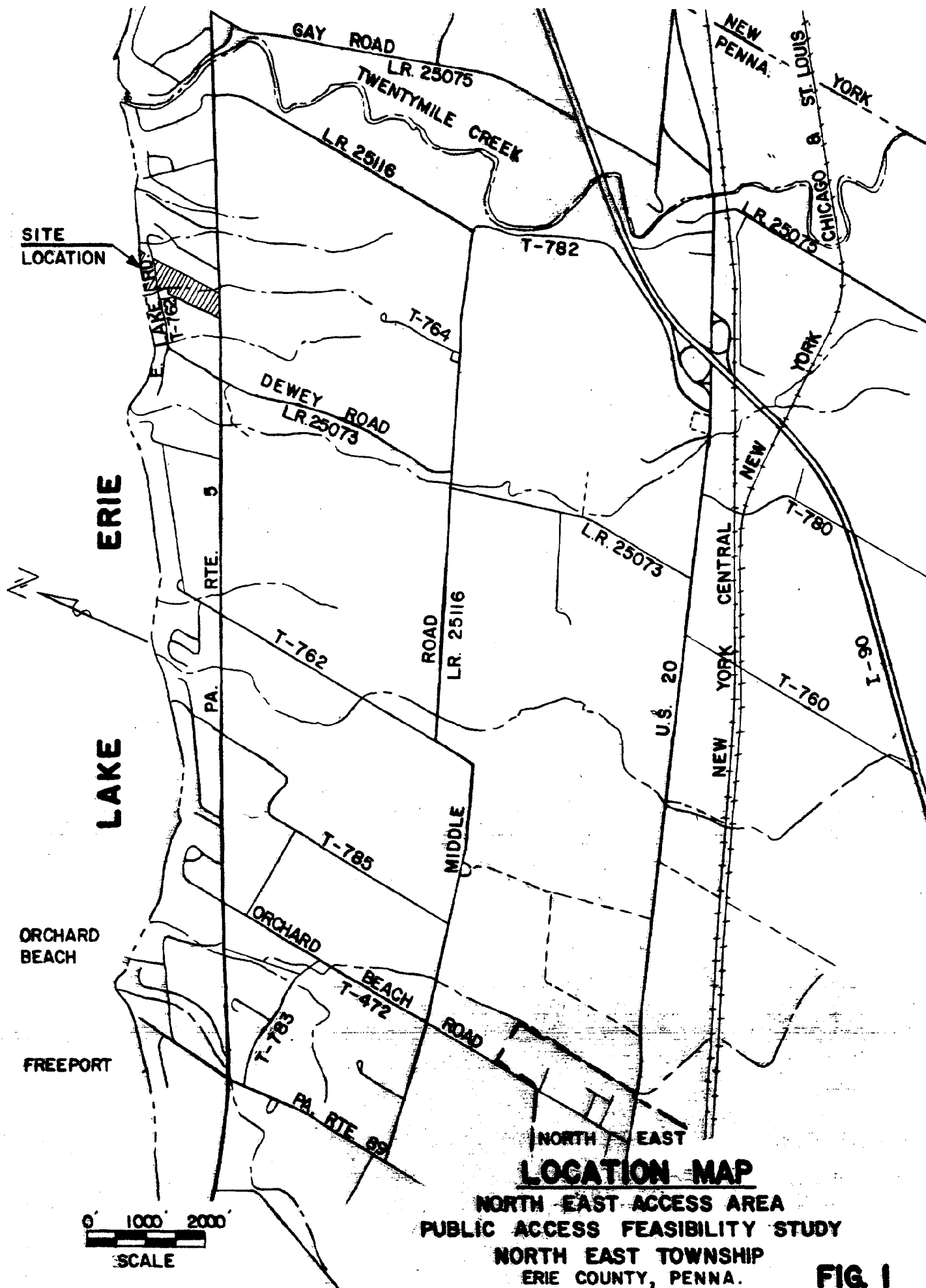
### General Location

The site of the Pennsylvania Fish Commission's North East Access Area, which locally is also known as the Dalrimple Property or Dewey Road Boat Launch, is located along the southeastern shore of Lake Erie in North East Township, Erie County, Pennsylvania. The location is approximately 17-1/2 miles northeast of the City of Erie; 2-1/2 miles northeast of the Borough of North East; 1/2 mile southwest of the mouth of Twenty Mile Creek; and, 1-1/2 miles southwest of the New York-Pennsylvania state line. The nearest harbor-of-refuge on Lake Erie east of the access area is thirteen miles away at Barcelona, New York. That facility is a shallow draft harbor for recreational craft. To the west, the nearest harbor-of-refuge is a deep draft harbor located seventeen miles away at the City of Erie.

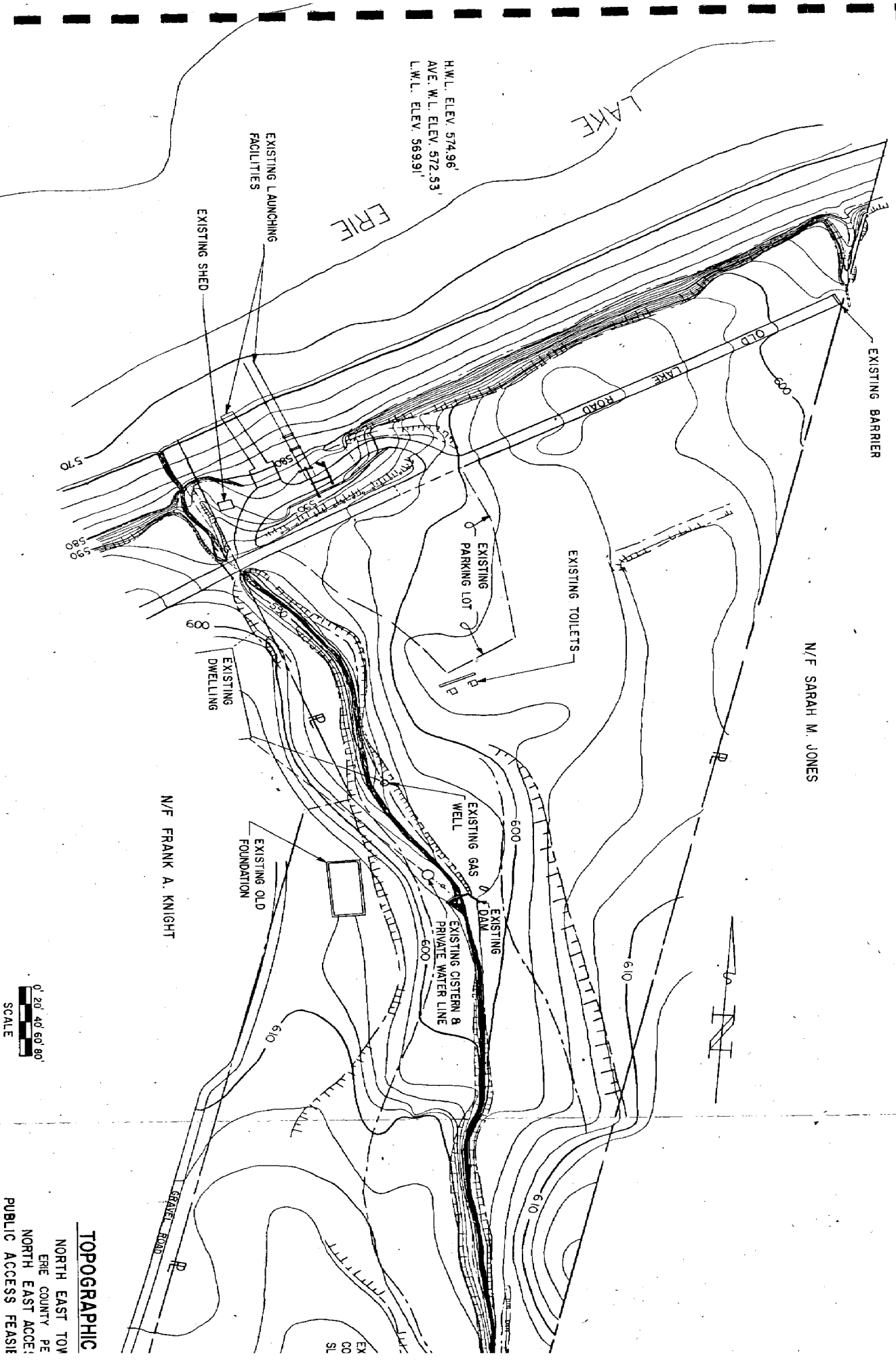
### Site Description

The 13.27 acre property containing the existing access facility was purchased in fee by the Pennsylvania Fish Commission through General State Authority (G.S.A.) funding in 1963. Construction of the existing launch ramp and gravel parking lot was completed in 1968. The property is bounded on the north for 740 feet by Lake Erie; on the east and west for 1,595 feet and 1,434 feet, respectively, by private agricultural and rural/residential lands; and, on the south for 420 feet by

Pennsylvania Traffic Route 5. Except for the existing recreational development, the site and surrounding properties can be characterized as agricultural and rural/residential. A small, intermittent flowing stream crosses the property diagonally from southeast to northwest. The property exhibits many of the shoreline characteristics that exist between the Erie and Barcelona harbors: there are no natural bays, shelters or navigable inlets. The property also has bluffs which are common to this shoreline.



**FIG. 1**



H.W.L. ELEV. 574.96'  
AVE. W.L. ELEV. 572.53'  
L.W.L. ELEV. 569.91'

N/F SARAH M. JONES

N/F FRANK A. KNIGHT

0' 20' 40' 60' 80'  
SCALE

**TOPOGRAPHIC**  
NORTH EAST TOWNSHIP  
ERIE COUNTY PENNSYLVANIA  
PUBLIC ACCESS FEASIBILITY STUDY

**TOPOGRAPHIC MAP**  
NORTH EAST TOWNSHIP  
ERIE COUNTY PENNA.  
NORTH EAST ACCESS AREA  
PUBLIC ACCESS FEASIBILITY STUDY

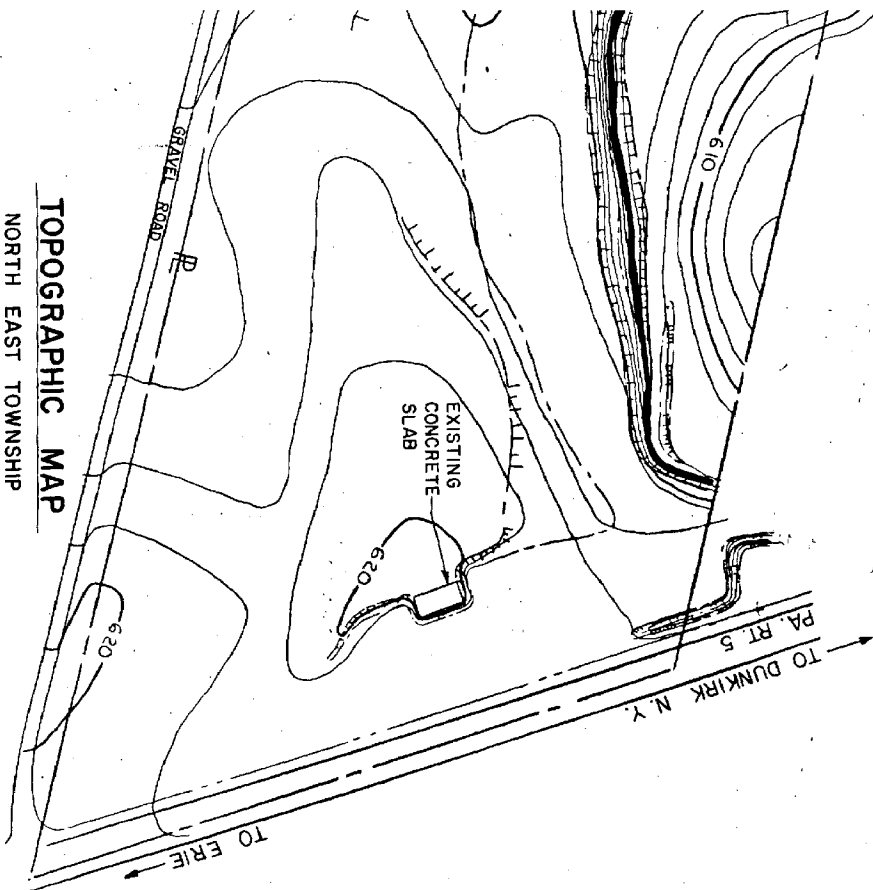


FIG. 2

### Climate

The climate at the site is strongly influenced by Lake Erie and is typical for the lake shore within a 10 to 15 mile area. The relatively warm waters of the lake tend to moderate the daily and seasonal temperature extremes of the air masses moving down from Canada. This prolongs the growing season and limits killing frosts in the fall and spring. The cool breezes off the lake during the summer add to the attractiveness of the site for recreational use. These same conditions tend to prolong the fall season and permit boating and fishing activity into November, much later in the year than would be expected at an area of this geographic latitude. The average annual precipitation is 37.2 inches, which is evenly dispersed over the year. The prevailing winds, which are mainly from the northwest and southwest, with the former predominating (See Figure No. 7), are capable of creating violent storms with waves reaching heights of five to eight feet in a very short time. The storms that do the most damage to the shoreline are those from the northwest.



### Geological Conditions

The underlying strata of the North East Access Area is a veneer of glacial lake deposits comprised of sand, silt, clay and some gravel, all resting on bedrock of Northeast Shale. Northeast Shale is a thinly bedded medium-light gray siltstone interbedded with medium gray shale. This shale is of marine origin from the late Devonian age (approximately 355 million years old) and contains few fossils. It tends to break up as flaggy or platey pieces, while the interbedded clay shale tends to break up as chippy or hackly fragments. The Northeast Shale beds are very close to horizontal and are not folded or faulted to any measurable degree.

### Bluff Stability and Recession.

This site is in a coastal section which is subject to light erosion problems according to the International Lake Erie Regulation Study Board's Report on the Regulation of Lake Erie Water Levels which was prepared in 1981. That conclusion is supported by the figures set forth in A Geotechnical Investigation of the Coastal Bluffs of Erie County, Pa., prepared by Coastal Research Associates, Inc. Their survey, which was made from September 1981 to September 1982, indicates that the recession rate of the bluffs in the site area is minimal. Referencing Table 2, Recession Rate Data, of that survey, the rate is equal to .051 feet (approximately 5/8 of an inch) per year. The major reason given for such a low rate of bluff recession is that the bedrock of underlying shale, which is well exposed along much of this coast, protects the bluffs by absorbing wave energy.

Shoreline Stability

The beach on the existing property is a mixture of fairly clean sand, shale and cobbles, but beach depth is generally very shallow because bedrock lies only a few feet below the surface.

Due to the eastward littoral drift along the lake shore, resulting from prevailing winds, a structure extending into the lake's waters tends to cause beach accretion on the western side and beach depletion on its eastern side. During final design of the proposed structures it will be necessary to determine where beach depletion could threaten stability of the shoreline and proper beachfront protection will be included in the project. At this time, it is believed the scope of this work can be included within Commonwealth lands.

### Soils

The soil information in this study was obtained from The Soil Survey, Erie County, Pennsylvania, prepared by the United States Department of Agriculture, Soil Conservation Service (SCS). The soil map (Figure No. 3) included in this study indicates the distribution of the soil types on the property site. The following discussion addresses each of the four different soils found on the property.

Beach and Riverwash (Ba). This miscellaneous land type is made up of unassorted sand, gravel, and small fragments of flagstone. Some of the larger beaches are located near the mouths of streams that empty into Lake Erie. Others are on Presque Isle, a baymouth bar north of Erie. In some areas there are narrow beaches along the entire Pennsylvania lake front. Riverwash forms temporary islands or bars in or along streams that have steeply sloping beds.

Before sediments are deposited on the beach, they are transported by streams and are then dropped into the waters of the lake. There, they are reworked by wave action and are then washed onto the beach. During storms the beach material is again reworked and is carried eastward by shore currents. In its place new sediments are deposited by waves. During the winter a well-defined beach is often altered greatly by storms.

Beach and Riverwash is not stable enough to maintain a cover of plants. It consists largely of material weathered from the underlying shale; it also includes some sediments of sandstone,

granite, and quartzite that were carried into the area by glaciers. No soil profile has been developed.

This miscellaneous land type has no value for agriculture, but it provides valuable areas for recreation. The effects of beach depletion can be minimized by installation of structural protection through nonstructural means such as replenishment with similar beach materials.

Wallington Fine Sandy Loam, 2 to 8 percent slopes (WaB).

Although it contains more sand, the profile of this soil resembles the profile described for the Wallington series. This soil is deep and has uniform slopes, most of which are less than 500 feet long. Surface drainage is moderate, and internal drainage is fair to poor. This is the important soil of the lake plain for vineyards and for growing vegetables.

The parent material consisted of lacustrine deposits derived from acid shale bedrock and from sandstone and limestone of glacial origin. These sediments were laid down as layers of silt and sand; some layers of clay were also deposited in areas of still, or slack, water. A firm layer or fragipan, that is slightly permeable to air and water begins at depths of 10 to 18 inches.

Wayland silt loam, 0 to 3 percent slopes (WdA). The profile of this soil is the same as described for the remainder of the Wayland series. This soil is level to nearly level and is subject to frequent flooding. Surface drainage is poor, and internal drainage is somewhat poor.

The Wayland series consists of deep, somewhat poorly drained soils on the flood plains of streams. In spring the soils are covered by water for long periods. The parent material was made up of sediments of silt and clay washed down from the upland. This material was derived from acid shale bedrock and from sandstone and limestone of glacial origin.

A fragipan begins at depths of 12 to 18 inches.

Williamson and Collamer fine sandy loams, 2 to 8 percent slopes (WeB). The profile of the Collamer soil in this mapping unit is the same as described for the remainder of the Collamer series.

The profile of the Williamson series resembles that of the Collamer soil, but it has a more highly developed fragipan below a depth of 30 inches. These soils have uniform slopes, most of which are less than 300 feet long. Surface and internal drainages are moderate.

They are made up of deep, moderately well drained soils of the lake plain. The soils are important for growing vegetables and fruits.

The parent material consisted of lacustrine deposits derived from acid shale bedrock and from sandstone and limestone of glacial origin. This material was laid down as layers of silt and sand and layers of clay were also deposited in areas of still, or slack, water.

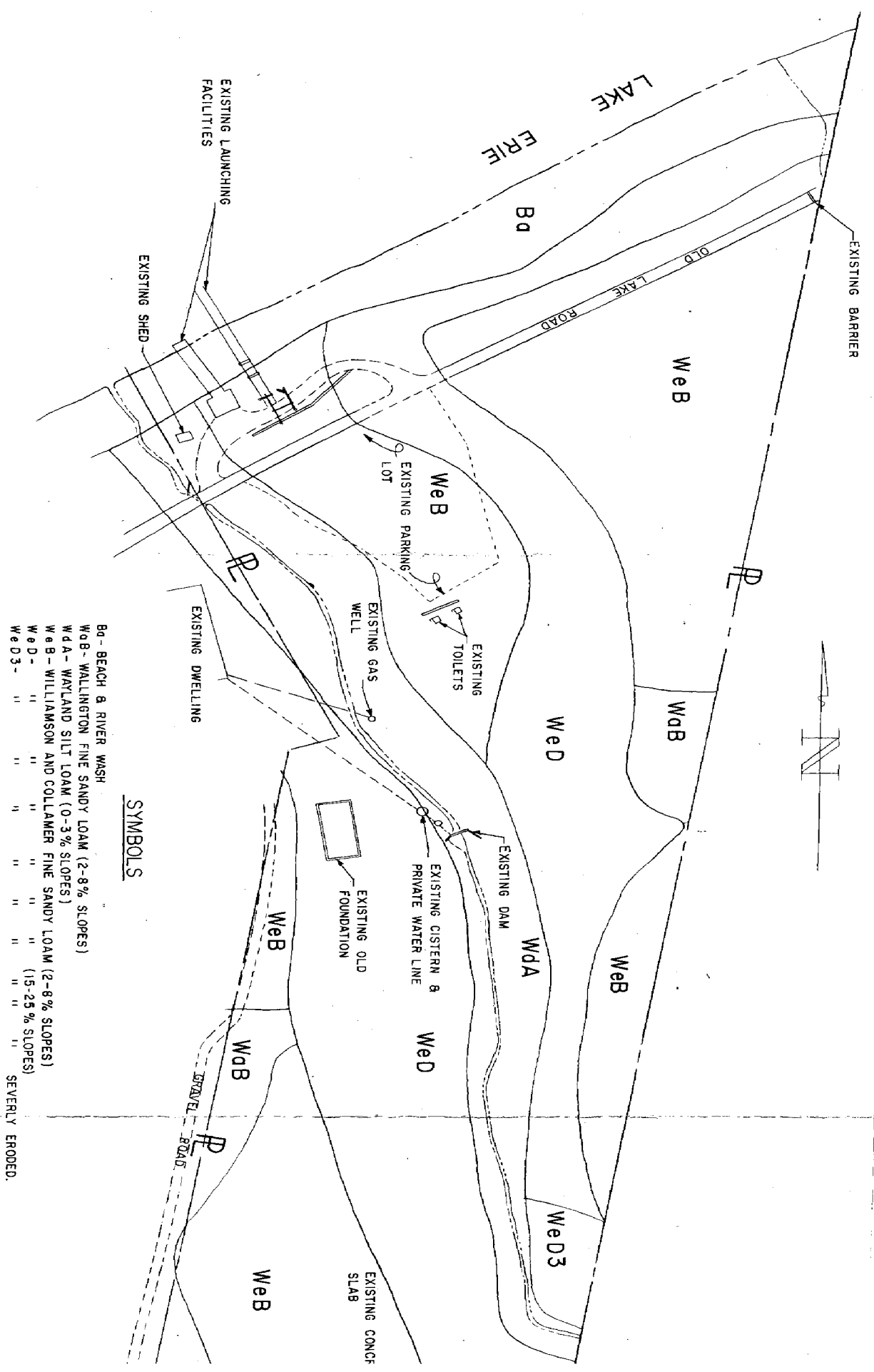
A fragipan begins at depths of 22 to 30 inches. This fragipan is firm when moist and nonsticky when wet. The Williamson soils, unlike the Collamer, have a well-developed fragipan.

In Erie County the Williamson soils occur with the Collamer soils in a complex pattern. Because it was difficult to separate the two series in mapping, they have been mapped together as Williamson and Collamer soils.

Williamson and Collamer Fine Sandy Loams 15 to 25% Slopes (WeD). This is the same soil as (WeB) with the exception of slope.

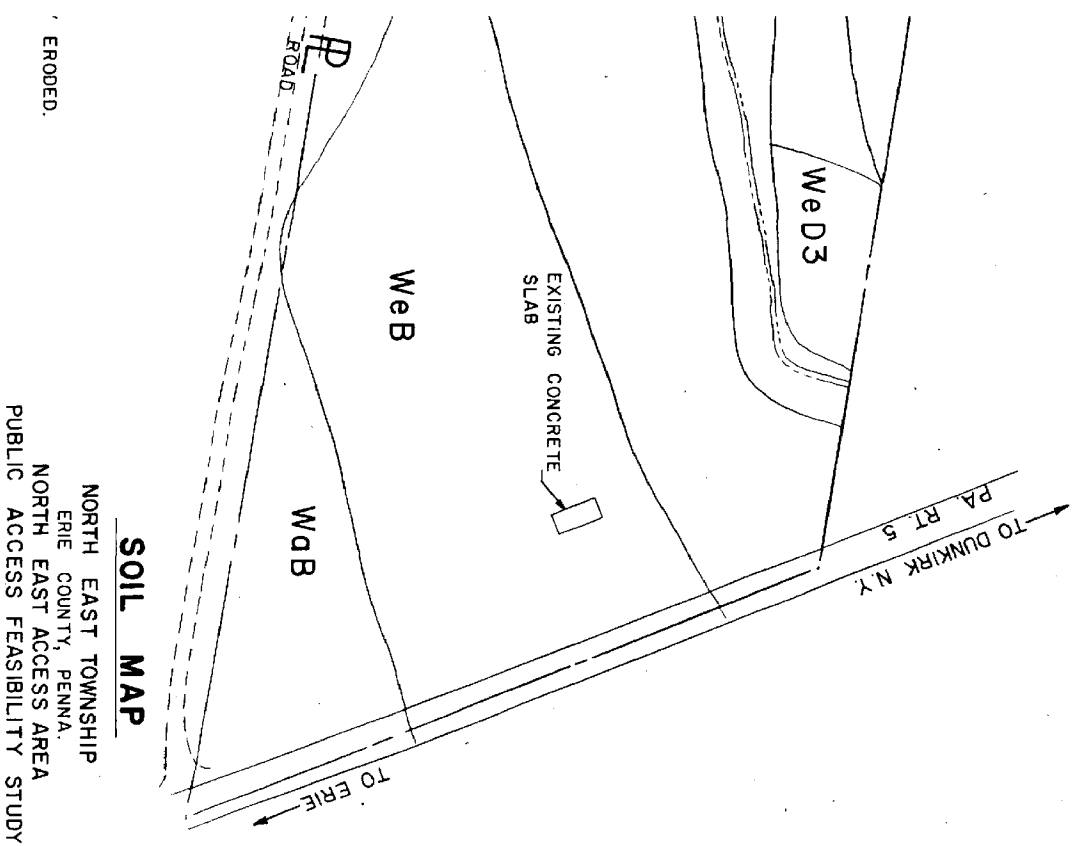
Williamson and Collamer Fine Sandy Loams 15 to 25% Slopes (WeD3). This is the same soil as (WeD) with the exception that it is severely eroded.

All these soil types have a seasonal high water table. It is not anticipated that there will be any unusual problems with these soils. Any project on this site will require the development and implementation of a soil erosion and sedimentation control plan.



# **SYMBOLS**

- Ba - BEACH & RIVER WASH
- Web - WALLINGTON FINE SANDY LOAM (2-8% SLOPES)
- WdA - WATLAND SILT LOAM (0-3% SLOPES)
- WeD - WILLIAMSON AND COLLAMER FINE SANDY LOAM (2-8% SLOPES)
- WeD3 - (15-25% SLOPES)
- Severely Eroded.



**SOIL MAP**

NORTH EAST TOWNSHIP  
ERIE COUNTY, PENNA.  
NORTH EAST ACCESS AREA  
PUBLIC ACCESS FEASIBILITY STUDY

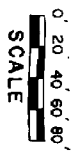
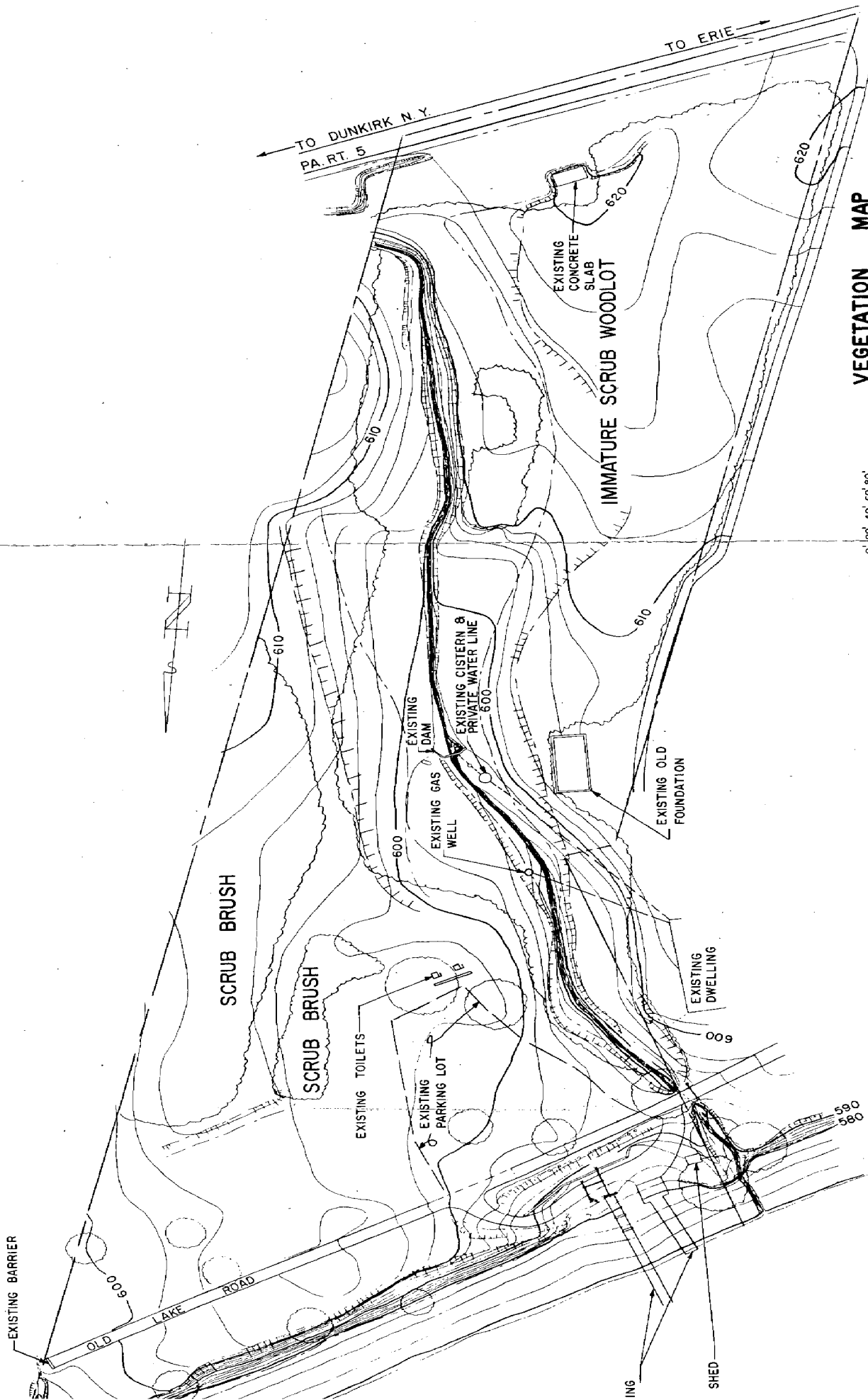


FIG. 3



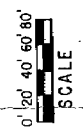
Vegetation

The vegetation structure on the access area property is shown on the accompanying Vegetation Map (Figure No. 4). Immature scrub woodlot extends from Pennsylvania Traffic Route 5 almost to the bluff overlooking Lake Erie. It is young, dense woodlot covering both sides of the course of the intermittent run and is made up of numerous immature tree species: sumac, maple, slippery elm, white birch, eastern cottonwood, quaking aspen and white pine. Intermingled in the higher tree species there is a dense ground cover, consisting primarily of thistles, scrubbrush, shrubs, and wild grape vines. There is also an area of cleared field consisting of a grassy knoll with a few large, more mature, deciduous trees. The remainder of the property is bluff and beach, an area of little or no vegetation, with the exception of a few large trees.

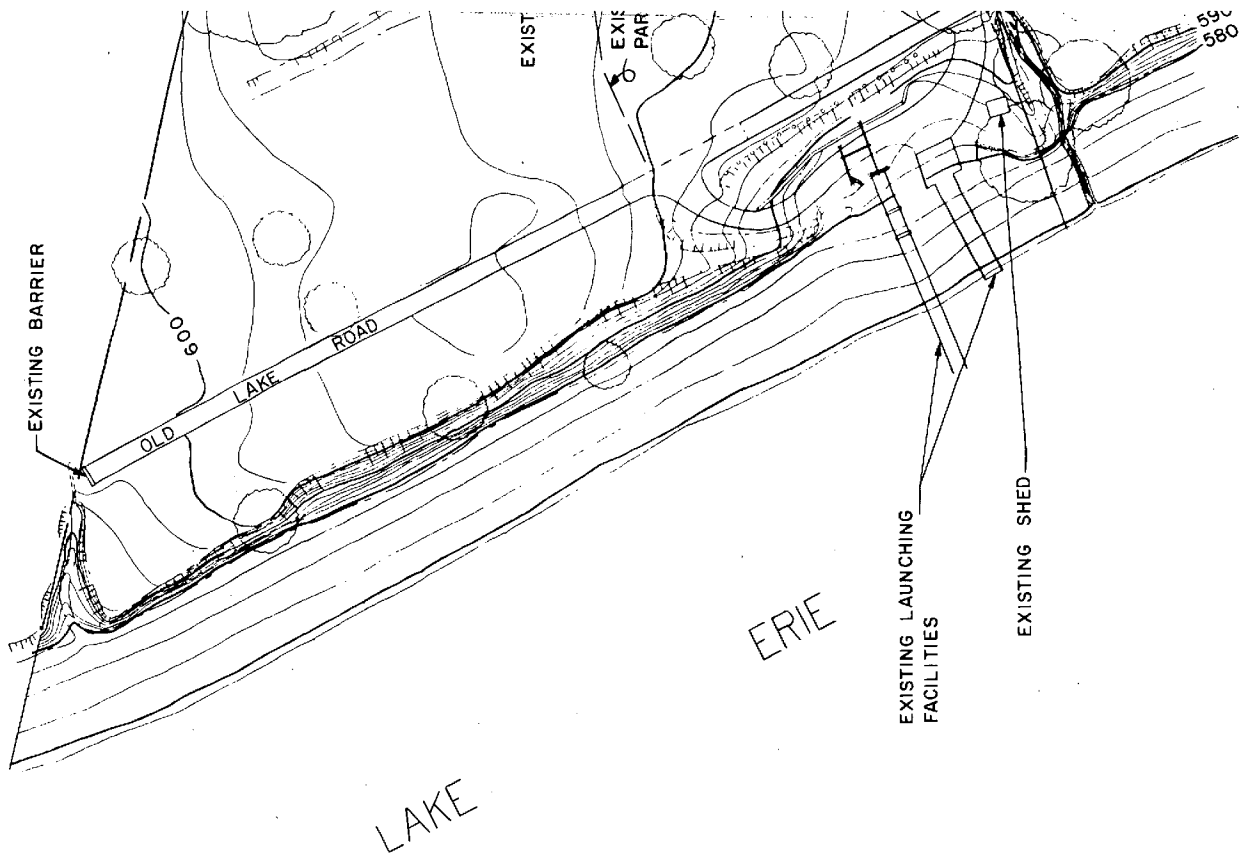


**VEGETATION MAP**

NORTH EAST TOWNSHIP  
ERIE COUNTY PENNA.  
NORTH EAST ACCESS AREA  
PUBLIC ACCESS FEASIBILITY STUDY

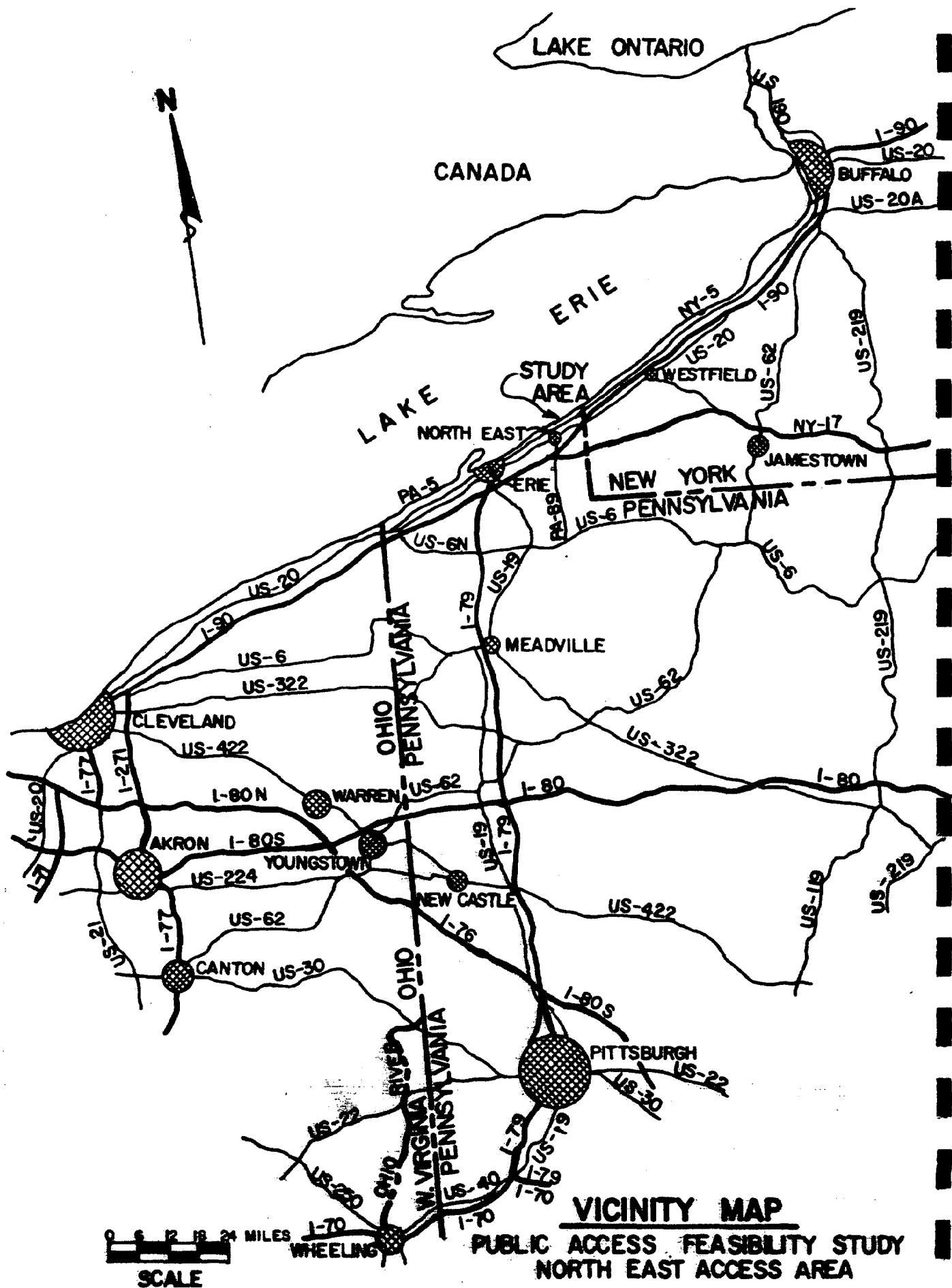


**FIG. 4**



Transportation

The principal arterial roads in the vicinity are Interstate Routes 79 and 90, which make this site readily accessible not only from Pittsburgh and northwestern Pennsylvania, but also from neighboring Ohio and New York. Other arterial roads serving the access site are Pa. Traffic Routes 89 and 5, and U.S. Traffic Route 20. Pa. Traffic Route 5 borders the property. Local public roads serving the property are Dewey Road, Orchard Beach Road, Middle Road, and Gay Road. These connect Route 20 to Route 5. The accompanying Vicinity Map (Figure No. 5) shows the larger connecting roads for the study area while the Location Map (Figure No. 1) shows the local road system and its relation to Interstate 90, and Pa. Traffic Routes 5, and 20.



**VICINITY MAP**  
**PUBLIC ACCESS FEASIBILITY STUDY**  
**NORTH EAST ACCESS AREA**  
 NORTH EAST TOWNSHIP, ERIE COUNTY, PENNSYLVANIA  
**FIG. 5**

### Utilities

The site currently has access to gas, electrical and telephone service as shown in Figure No. 6. The National Fuel Gas Company's pipeline crosses the property adjacent and parallel to Old Lake Road. Reportedly the gas line is old and contains leaks within the section crossing the property. It is the main gas line supplying customers between the east side of the property and the New York state line. Any major construction on this site will require either replacement of the gas line or its relocation along Pa. Traffic Route 5.

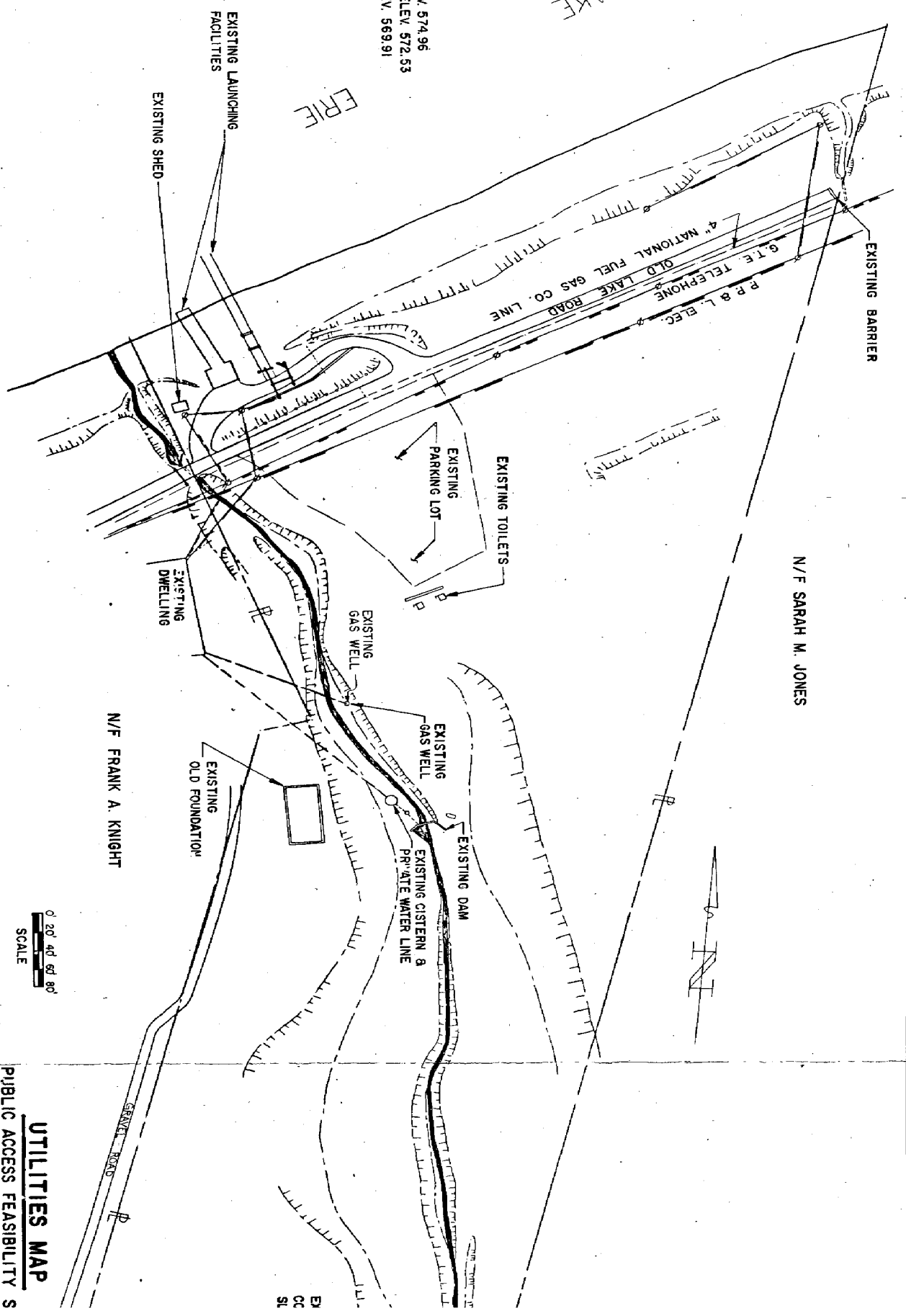
The Pennsylvania Electric Company's secondary service pole line crosses the property parallel to and south of Old Lake Road. This line provides loop service to property to the east of the site.

The General Telephone Company's pole line crosses the property parallel to and south of Old Lake Road. Their underground phone line also crosses the property parallel to and north of Pa. Traffic Route 5.

A private water line supplying the Knight residence originates on and crosses a portion of the property.

According to the North East Regional Comprehensive Plan Update, adopted in February, 1983, a public sewerage system is projected to be available to this site about 1997 and a public water supply system about 1995. Currently, the closest public water service is approximately one mile distant, while sewer service is approximately 2.5 to 3 miles distant.

H.W.L. ELEV. 574.96  
AVE. W.L. ELEV. 572.53  
L.W.L. ELEV. 569.91



N/F SARAH M. JONES

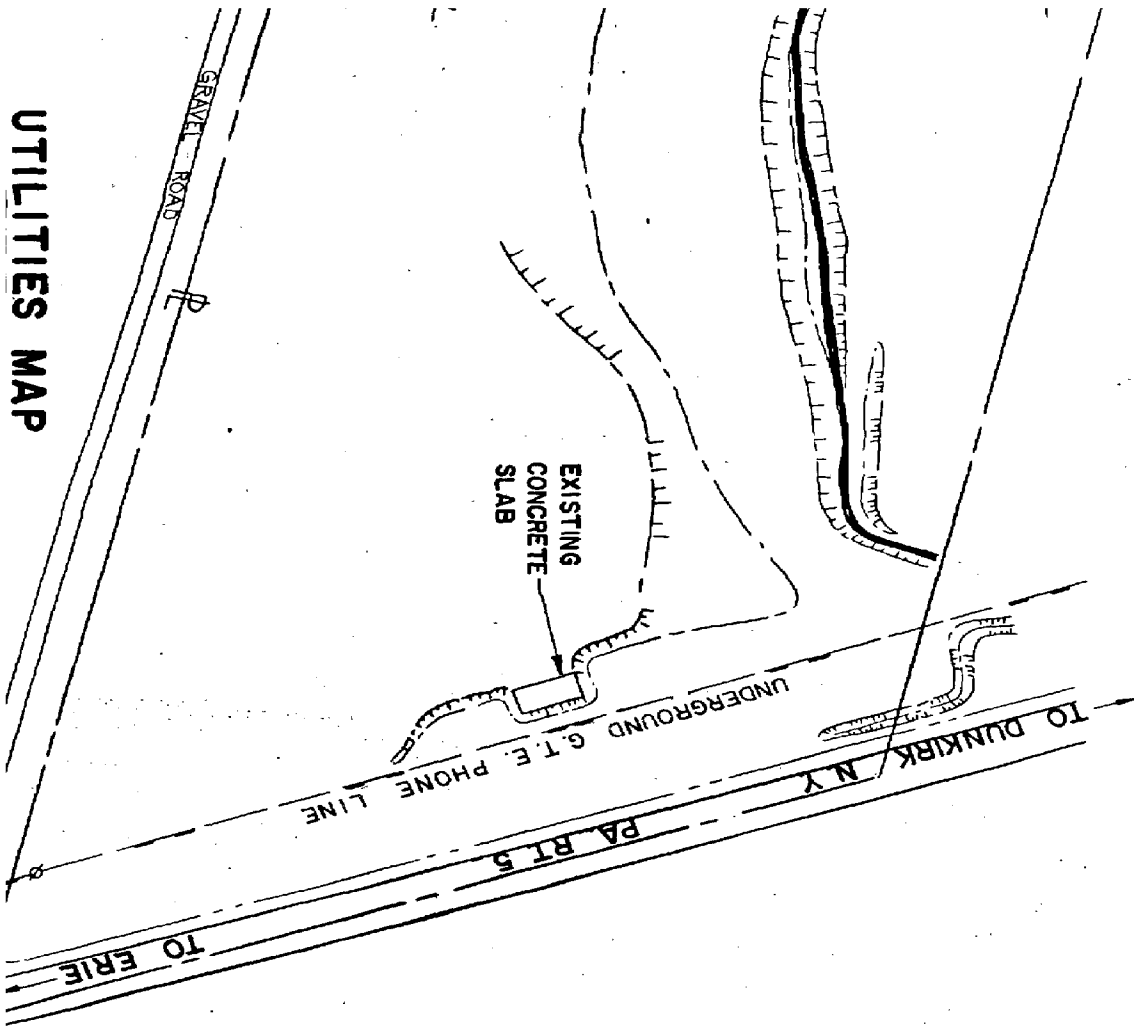
N/F FRANK A. KNIGHT

0 20' 40' 60' 80'  
SCALE

**UTILITIES MAP**  
**PUBLIC ACCESS FEASIBILITY S**  
**NORTH EAST ACCESS ARE**  
**NORTH EAST TOWNSHIP ERIE COUNTY, PENI**

EX  
CC  
SL

UTILITIES MAP





Hydrology

The intermittent stream crossing the study area carries flows ranging from zero to a maximum flow of approximately 175 cubic feet per second during heavy rains, which can result in a bank full condition and minor flooding. These flows are produced from a 98 acre drainage area. During the 20 year period that the Commonwealth has owned the property, damaging flood flows have not been encountered. All the runoff water crossing this site flows directly into Lake Erie. The designated flood plain is the beach area and the narrow land strip along the stream. Any additional runoff created by a project on this site can be directed either to this stream or directly to Lake Erie by pipe and will not create flooding problems. So long as such waters are not directed over the bluff face or surface, no erosion or bluff stability problems are anticipated.

There have been reports of sewage odors emanating from the stream. This condition has been referred to the Erie County Health Department and appropriate measures are being taken to eliminate the source or sources of the problem. Prior to development of any final project construction plans, this problem should again be investigated to make certain it has been properly addressed.

Water Level Lake Erie

The U.S. Army Corps of Engineers records the water levels of the Great Lakes in terms of the International Great Lakes Datum (1955)\*. The following chart shows these elevations converted to United States Geological Survey 1929 Mean Sea Level Datum for the normal recreational boating season.

	Max		Min		Average	
	IGLD	USGS	IGLD	USGS	IGLD	USGS
May	573.25	574.70	568.43	569.88	570.93	572.38
June	573.51	574.96	568.46	569.91	571.06	572.51
July	573.34	574.79	568.46	569.91	571.02	572.47
Aug.	573.03	574.48	568.36	569.81	570.83	572.28
Sept.	572.51	573.96	568.23	569.68	570.50	571.95
Oct.	572.14	573.59	567.95	569.40	570.18	571.63
Nov.	572.17	573.62	567.60	569.05	569.92	571.37
Ave. for Rec. Season						572.08
Recorded Min.				569.05		
Recorded Max.		574.96				
Average for Entire Year						572.53

\*Reference: Monthly Bulletin of Lake Levels for the Great Lakes. U.S. Army Corps of Engineers, Date July 1983.

In October 1982 Pennsylvania Fish Commission surveying personnel conducted a topographical survey of the site. Mean water level at the time of the survey was approximately 572.5 (USGS 1929 datum). All elevations within this report, except those marked IGLD 1955, are in accordance with USGS 1929 datum. For the purpose of this report mean water level will be 572.5 which corresponds with the yearly average of 572.53.

Wave Statistics - Lake Erie

The Information in this section was supplied by the great Lakes Environmental Research Laboratory in Ann Arbor, Michigan.

(Correspondence No. 12)

<u>Wave Height</u>	<u>% of Occurrence</u>
0 - 1 ft.	31.9
1 - 2 ft.	25.4
2 - 3 ft.	24.6
3 - 4 ft.	10.0
4 - 5 ft.	4.7
5 - 6 ft.	2.6
6 - 7 ft.	.7
7 - 8 ft.	.1
8 - 9 ft.	.0

For the purpose of this study, only wave heights less than 4 feet will be analyzed for launching and retrieval, because most small pleasure craft leave the lake before the waves height reaches 3 feet. As indicated in the above, wave heights in excess of 3 feet occur only 18.1% of the time.

Archeological Resources

Information from the Pennsylvania Historical and Museum Commission indicates that no known National Register eligible historic or archeological properties are located in the vicinity of the North East Access Area site (Correspondence No. 7).

### Wildlife and Fishes

The Lake Erie waters and shoreline in the vicinity of the proposed access area are inhabited by a diverse fish and wildlife fauna. Four tributary streams located within six miles of the site are stocked annually with non-native coho salmon and/or steelhead trout by the Pennsylvania Fish Commission and area sportsmen's cooperative nurseries. These streams are Twenty Mile Creek, located just east of the site, and Orchard Beach Run, Sixteen Mile Creek, and Twelve Mile Creek, located to the west. Other non-native salmonids stocked in tributaries further west on Pennsylvania's shoreline and to the east in the New York waters of Lake Erie are chinook salmon, and brown trout. Lake trout, which are native to Lake Erie, are also being stocked each year in the main lake near the New York-Pennsylvania border in a cooperative effort among the Pennsylvania Fish Commission, New York Department of Environmental Conservation and the United States Fish and Wildlife Service. With the exception of the lake trout, each of the salmonids is anadromous, and can be found in large numbers near shore during the fall as they return to the tributary streams to spawn. Steelhead trout continue to enter the streams through the winter, with a second, larger spawning run peaking in the spring. During the summer, all the salmonids congregate in the cold deep waters located several miles offshore the northeast site.

Other fish species inhabiting the waters near the study area include walleye, yellow perch, smallmouth bass, white bass,

freshwater drum, rock bass, brown bullhead, channel catfish, stonecat, carp, white sucker, redhorse sucker, rainbow smelt, emerald shiner, spottail shiner, trout perch and gizzard shad. It is likely that white perch, whitefish and turbot also venture through the region periodically. Numerous other less abundant species can also be found in these waters.

Two species of fish which have been collected in the general area from Presque Isle Bay east to the New York state line are listed by the Commonwealth of Pennsylvania as threatened and endangered. The Eastern sand darter is listed as threatened and the Lake sturgeon is listed as endangered. Any redevelopment activity at the site is not expected to cause any significant impact upon either of these species.

Many species of waterfowl can be seen intermittently in the waters adjacent to the study area, particularly Canada geese, red breasted merganser, and various duck species such as scaup, canvasback, redhead, ringneck, goldeneye, and bufflehead. Ringbilled gulls, herring gulls, and common terns are abundant as well as various shorebirds including sandpipers and killdeer. The shoreline of the study area is characteristic of the first stages of succession of cultivated land with its annuals, briars, sumac, and cottonwoods, and is inhabited by numerous songbirds and two game birds, woodcock and ring-necked pheasant.

Mammals inhabiting the shoreline in the study area year round include cottontail rabbits, woodchucks, and other small rodents and insectivores such as moles, shrews, voles, mice and

wood rats. Other mammals which probably pass through the area are opossum, skunk, raccoon, mink, weasel, and occasionally white tailed deer. The area is also marginally suitable as squirrel habitat.

The area adjacent to the small intermittent stream which crosses the property provides suitable habitat for various frogs, toads, salamanders, snakes and turtles.

One species of reptile, the Blandings turtle, is classified by the Commonwealth of Pennsylvania as endangered. It has been collected recently east of the Borough of Northeast. However, any redevelopment activity at the site would not be expected to significantly impact this species.

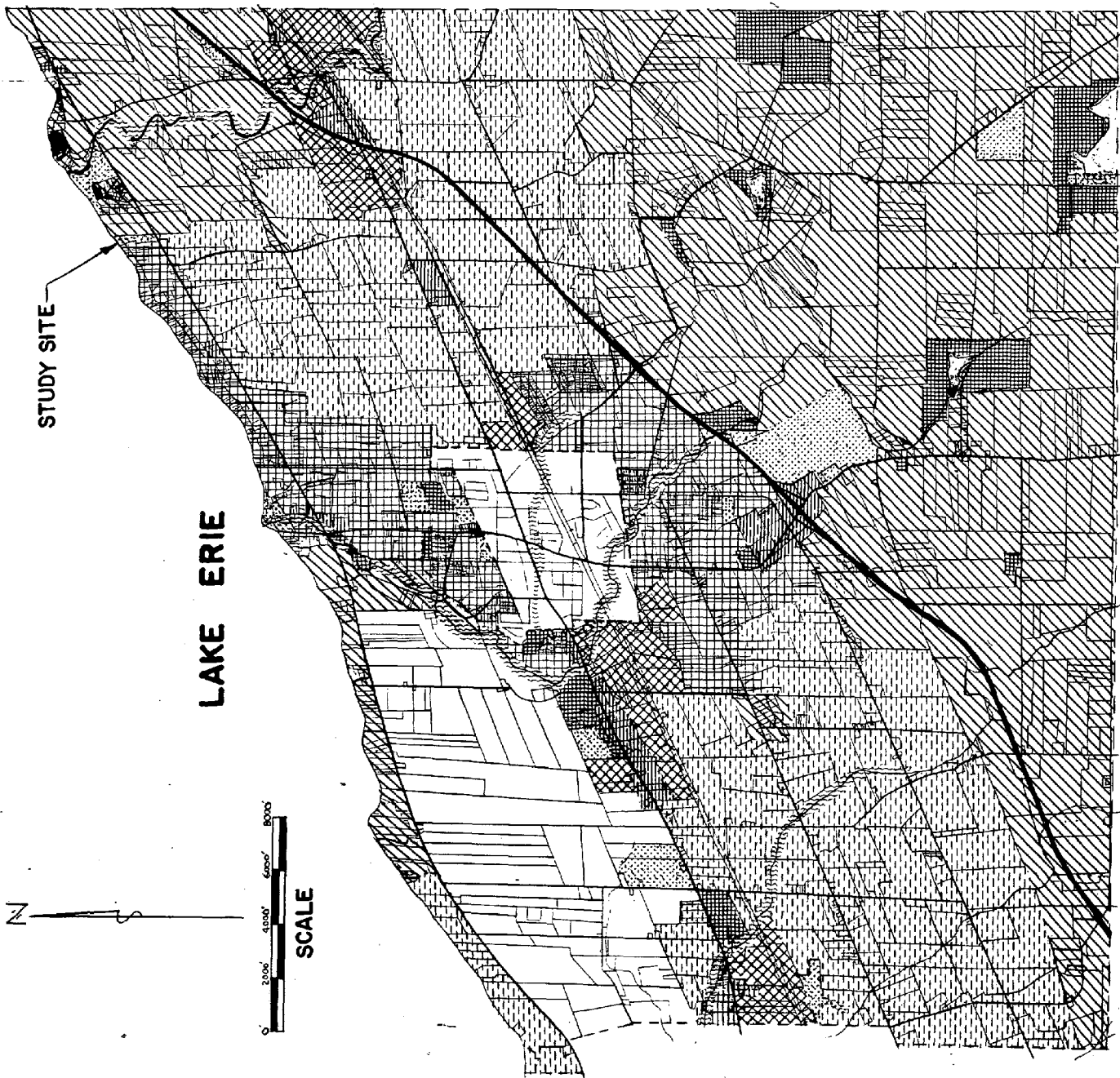
Because of the small size of the study area and the transient nature of most of the fauna which inhabit it, development of the proposed facility should cause minimal detrimental impact on the existing fish and wildlife. A small but insignificant amount of spawning habitat for shallow water spawners such as smallmouth bass, yellow perch, and rock bass could be disrupted. The small stream which traverses the property is not accessible to anadromous salmonids and provides no spawning habitat for any other Lake Erie species. The region is not suitable as a nesting area for waterfowl, but serves primarily as a feeding and resting area. As such, any impact on waterfowl is likely to be beneficial, as the proposed breakwater will provide protection during the late fall, winter, and early spring when boat use will be minimal and waterfowl migration is at its peak. Development of a parking area will disrupt an area

which can now be used as a resting and feeding area for woodcock and ring-necked pheasant. Potential impacts on the resident mammal population can be minimized by leaving a buffer zone between the parking area and the lands to the east, the stream to the west and Pa. Traffic Route 5 to the south.












Land Use

In accordance with the North East Township Regional Comprehensive Plan Update approved February 1983, the descending order of acreage of land use by zones in the township is (1) rural residential; (2) agricultural; (3) preservation; (4) suburban-residential; (5) recreational; (6) commercial; (7) public and institutional; (8) industrial; and, (9) conservation. The accompanying map (Figure No. 8) of North East Township indicates the distribution of land use throughout the township. The study site is zoned recreational. Adjacent properties are rural residential.



**LEGEND**

- |                                                                                   |                        |
|-----------------------------------------------------------------------------------|------------------------|
|  | PRESERVATION           |
|  | AGRICULTURAL           |
|  | RURAL RESIDENTIAL      |
|  | SUBURBAN RESIDENTIAL   |
|  | COMMERCIAL             |
|  | RECREATIONAL           |
|  | PUBLIC & INSTITUTIONAL |
|  | INDUSTRIAL             |
|  | CONSERVATION           |

**TOWNSHIP LAND USE PLAN**  
NORTH EAST ACCESS AREA  
PUBLIC ACCESS FEASIBILITY STUDY  
NORTH EAST TOWNSHIP  
EDIE COUNTY DENNA

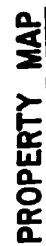
### Neighborhood Issues

The accompanying property map (Figure No. 9) shows the properties to the east and west of the study area. This information was obtained from the Erie County tax and assessment maps and is in no way intended to be precise or field surveyed.

During the fact-finding phase of this study the neighbors interviewed expressed their concerns with the possibility of increased problems associated with redeveloping the facilities at this site. In addition, there is some evidence that the immediate residents to the east and west, Sarah M. Jones and Frank A. Knight, have experienced problems with noise, littering, trespassing and other nuisance problems from visitors to this area. (Correspondence No. 1 through 5) User behavior may potentially be the most important social problem with any proposed project development.

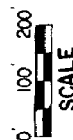
The neighbors interviewed were most cooperative and hospitable. Mr. Knight has owned his property ever since the Fish Commission acquired this property and Ms. Jones has owned the adjoining property since 1975.

The user problems experienced at this site are frequently caused by users other than the fishing and boating public, and they normally occur at night or during periods of unauthorized use. Littering, trespassing, noise and dust problems will be controlled through good project design involving such things as: Proper vehicle access, screen plantings, fencing, bituminous paving, accompanied by increased law enforcement effort and modified hours of operation.



**NORTH EAST ACCESS AREA  
PUBLIC ACCESS FEASIBILITY STUDY  
NORTH EAST TOWNSHIP  
ERIE COUNTY, PENNA.**

**Fig. 9**



Public Demand for Fishing and Boating Access

Pennsylvania Lake Erie waters receive high levels of recreational angling and boating use. Erie, Pennsylvania's third largest city, is located near the center of the state's shoreline, and Pittsburgh, the state's second largest city, is located just 128 miles south of the lake with direct access via Interstate Route 79. An angler and boater survey conducted by the Pennsylvania Fish Commission revealed that approximately 1,957,900 hours of recreational angling and boating use were expended on the state's Lake Erie waters from June 1981-May 1982 (Young and Lahr 1982). Anglers traveled to the lake from 51 of the state's 67 counties, 29 states, and Washington, D.C. The vast majority of this use (1,866,200 hours) occurred in the waters situated between the East Avenue Launch Ramp, located in the city of Erie, and the Ohio State line. These west side access areas are often overcrowded, particularly during the fall salmon and trout season. A major reason for this is that adequate and safe boating access east of East Avenue Launch Ramp is severely limited. Presently, the only public boating facilities in this eastern region, which constitutes nearly 30 percent of Pennsylvania's 43 mile shoreline, are located at Shade's Beach, Twelve Mile Creek, and the existing facility at North East. The launch ramps at Shade's Beach and North East which are similar in design, are unprotected from the main lake and can only be used at times of minimal wave action. Launching and retrieval, which must be done one boat at a time, is slow, laborious, and

dangerous, particularly during sudden storms which may occur on Lake Erie. The ramp at Twelve Mile Creek, also unprotected, is in very poor condition and is often impossible to use. The nearest protected harbors are at Presque Isle, 17 miles to the west, and at Barcelona, New York, 13 miles to the east of the site.

The study site is in a prime location for angling, although most is available only by use of a boat. Some shore angling is presently done, but the physical nature of the site and the lack of suitable fish habitat within casting distance does not encourage shore fishing, particularly for the more important gamefishes. Walleye, coho and chinook salmon, steelhead, lake trout, yellow perch, smallmouth bass, and white bass are abundant in the waters off the site during the spring, summer, and fall. Salmon, stocked annually in four tributary streams located within six miles of the site, are abundant relatively near shore during the fall spawning run, as are steelhead trout which are available from fall through late spring.

A plan entitled "Strategic Plan for Lake Trout Management in Eastern Lake Erie," was recently developed by the Lake Trout Task Group for Lake Erie under the Great Lakes Fishery Commission. This plan was initiated primarily by Pennsylvania and New York to replenish stocks of lake trout in the deeper waters of eastern Lake Erie from Presque Isle eastward to the general area of Angola, New York.

Approximately 100,000 to 200,000 yearlings supplied by the U.S. Fish and Wildlife Service are currently being stocked in

this portion of Lake Erie by helicopter each spring. The ultimate objective is to stock up to 400,000 yearlings annually, with the expectation that at least 50% of this number will eventually be provided through natural recruitment.

The overall objective is to attain an annual adult population of 200,000 by the year 2000 to approximate the size of the stocks that early records indicated were available in the 1880's. An angler exploitation rate of up to 30% is anticipated, which extrapolates into a very significant addition to the fishery available just two miles off shore from the study site. These deep offshore waters are also inhabited by other salmonids during the summer and can be pursued by boating anglers equipped with downriggers. Each of these species is highly preferred by Pennsylvania's Lake Erie sport anglers (Young and Lahr 1982).

If a facility, which could accommodate boats of 25' to 26' were developed at this site, anglers could launch at this location and avoid boat trips of up to 17 miles from the Erie area.

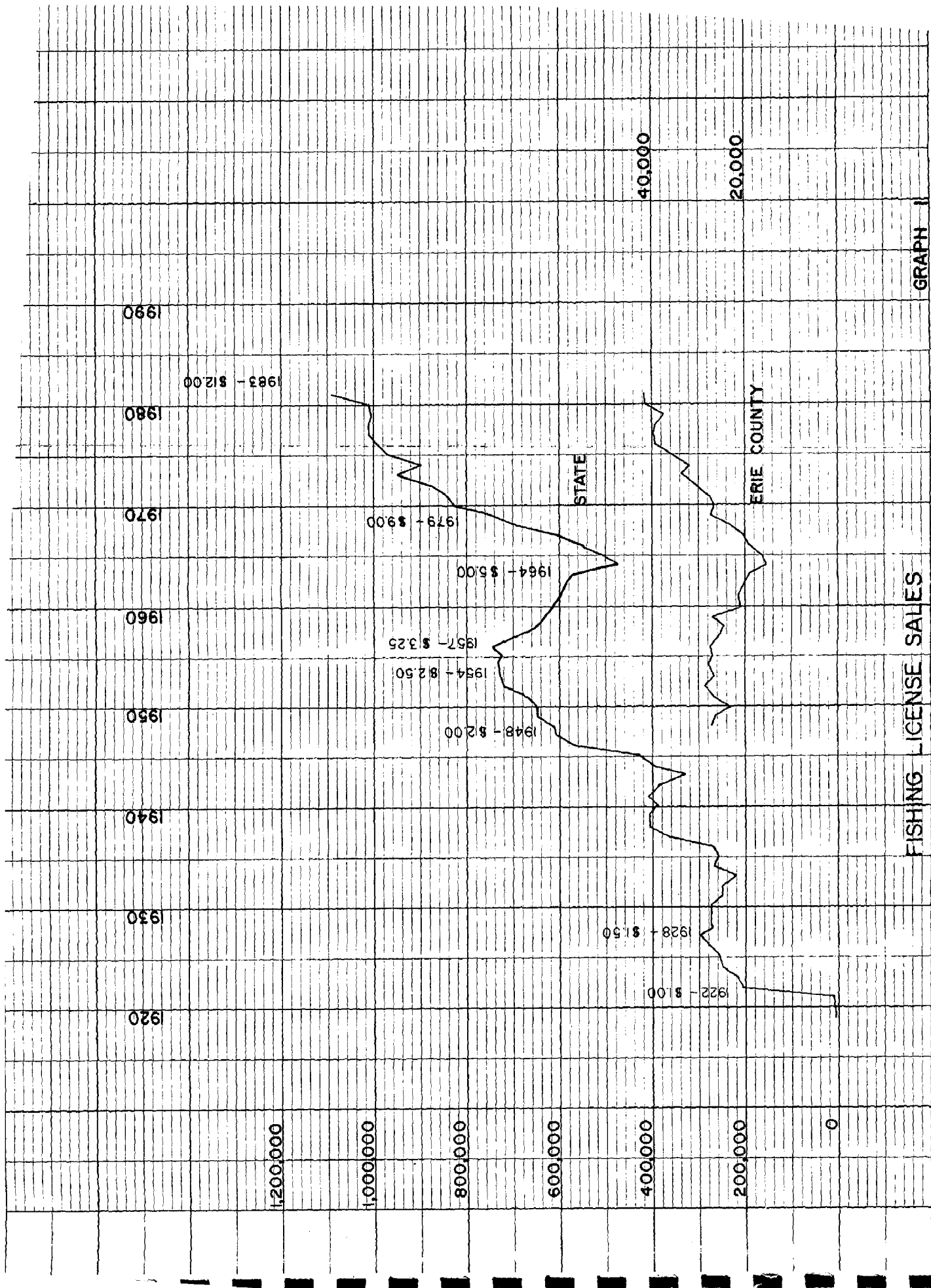
In conjunction with this overall Eastern Basin fishery, there is an apparent need for mooring sites for charter boats which also must make the long trip from the Erie area to this deep water to utilize the summer and fall fishery. This need adds yet another factor to be considered in the overall public demand for a redeveloped facility. Non-angling boaters, which were found to constitute over half the total boating usage on Pennsylvania's Lake Erie waters (Young and Lahr 1982), will also greatly benefit from additional access in the northeast region.

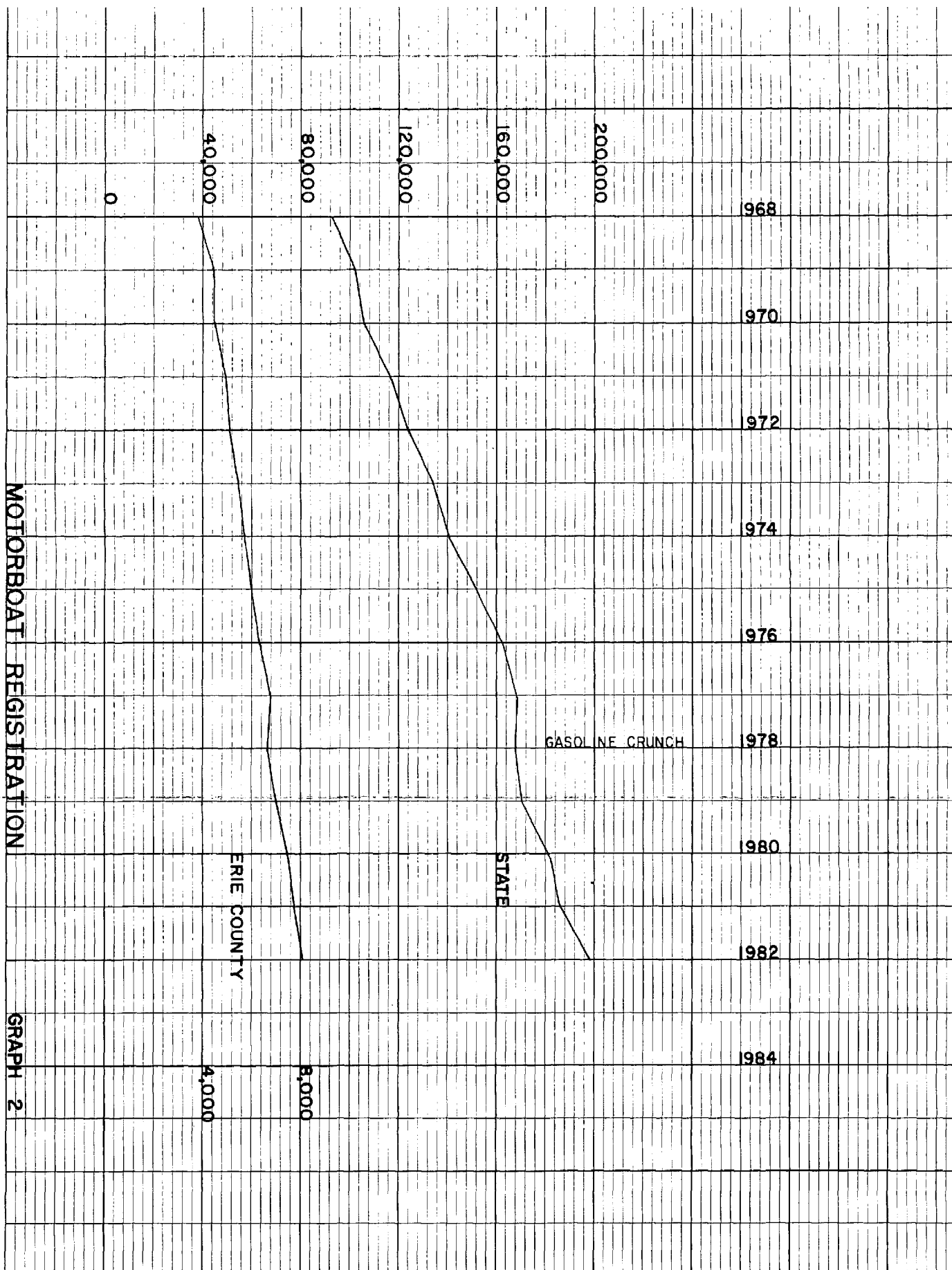
Fishing license sales, both statewide and in Erie County have dramatically increased over the past decade (see Graph 1). Likewise, boating registration in the state and Erie County have more than doubled since 1968 (see Graph 2). These trends are expected to continue and will cause increased pressure on the existing limited boating and fishing facilities.



GRAPH 1

FISHING LICENSE SALES





MOTORBOAT REGISTRATION

GRAPH 2

Inventory of Fishing and Boating Facilities for Lake Erie Along  
the Pennsylvania Shoreline

The following tables and map provide an inventory of the existing public access areas along Lake Erie and information on the facilities provided.

Although this inventory in itself does not address the specific needs for boating and fishing facilities, it does illustrate graphically that the ratio of existing facilities per mile of shoreline is substantially less for the area from the city of Erie east to the New York state line than the area from Erie west to the Ohio state line. Specifically there are two times as many public car stalls per mile to the west as east, 1.4 as many public car-trailer stalls per mile to the west and there are 5.3 times as many public launch ramps to the west than the east. This last item is even more significant as it is the presence of protected launch ramps which increase boating safety by providing better and quicker boat retrieval from the lake when storms occur.

RAMPS & LIFTS	WEST	ERIE	EAST
Total Number of Ramps	10	16 (17-Lifts)	2 (4-Lifts)
Total Number of Public Ramps	7	14	1
Number of Boats that Could Be Launched at Same Time (Not Including Lifts)	11	26	2
Number of Ramps Per Mile of Shoreline	.45	4.2	.12
Number of Public Ramps Per Mile of Shoreline	.32	3.7	.06
Miles of Shoreline	22.1	3.8	17.1
PARKING			
Number of Car-Trailer Stalls	324	631	196
Number of Car Stalls	354	1,060	195
Number Car-Trailer Stalls per Mile Shoreline	14.7	166.1	11.5
Number Car Stalls Per Mile Shoreline	16.0	278.9	11.4
Number Car-Trailer & Car Stalls Per Mile Shoreline	30.7	445.0	22.9
Number Public Car-Trailer Stalls	189	422	135
Number Public Car-Trailer Stalls Per Mile Shoreline	8.6	111.1	7.9
Number Public Car Stalls	224	590	90
Number Public Car Stalls Per Mile Shoreline	10.1	155.3	5.3
Number Public Sites W/Comfort Facilities	6	9	4
Number of Public Sites	4	22	4
Number of Private Sites	6	15	6

# ERIE SHORE PUBLIC ACCESS INVENTORY (West of Erie)

Y = Yes  
N = No

Number	Area Name	Ramps					Parking				Fishing				Marina					Comfort Station				
		Yes/No	Number	Width	% Slope	Fee	Yes/No	Fee	Car Trailer	Car Only	Handicapped	Yes/No	Shore	Pier	Boat	Yes/No	Gas	Concession	Repairs	Boat Storage	Yes/No	Flush	Public	Private
1	Raccoon Creek Park	N	1	12'	12%	N	Y	N	25	35	N	Y	Y	N	Y	N	N	N	N	N	Y	N	Y	
2	Eagley Road	N					Y	N	35	20	N	Y	Y	N	N	N	N	N	N	N	Y	N	Y	
3	Virginia's Beach	Y	1	15'		Y	Y	Y	40	40	N	Y	Y	Y	Y	N	N	N	N	N	Y	N	Y	Y
4	Crooked Creek	N					N					N	N	N	N	N	N	N	N	N	N	N		Y
5	Elk Creek West Bank	N					N					N	Y	N	N	N	N	N	N	N	N	N	Y	
6	Elk Creek East Bank	Y	1	20'	12%	Y \$3.	Y	Y \$3/da.	50	30	N	Y	Y	Y	Y	Y	Y	Y	N	73 slips	Y	Y	Y	Y
7	Godfrey Run	N					N					N	Y	N	N	N	N	N	N	N	N	N	Y	Y
8	Trout Run	Y	1	10'		Y	Y	Y	25	30	N	Y	Y	Y	Y	Y	Y	N	N	30 slips	Y	Y		Y
9	Walnut Creek	Y	6	12'	12%	N	Y	N	129	169	Y	Y	Y	Y	Y	Y	N	N	N	73 slips	Y	Y	Y	

ERIE SHORE PUBLIC ACCESS INVENTORY

(West of Erie)

**Y = Yes**

$$\frac{N_0}{N}$$
[illegible]

ERIE SHORE PUBLIC ACCESS INVENTORY  
(Erie)

Y = Yes  
N = No

Number	Area Name	Ramps					Parking					Fishing				Marina					Comfort Station		Private	
		Yes/No	Number	Width	% Slope	Fee	Yes/No	Fee	Car Trailer	Car Only	Handicapped	Yes/No	Shore	Pier	Boat	Yes/No	Gas	Concession	Repairs	Boat Storage	Yes/No	Flush		Public
11	West Point	N					Y	N	0	10	N	Y	Y	N	N	N	N	N	N	N	N		Y	
12	Swan Cove	N					Y	N	0	30	N	Y	Y	N	N	N	N	N	N	N	Y	N	Y	
13	Niagara Boat Ramp	Y	1 1	15' 27'	10% 10%	N	Y	N	40	20	N	Y	Y	Y	Y	N	N	N	N	N	N		Y	
14	Ferry Slip	N					Y	N	N	30	N	Y	Y	N	N	N	N	N	N	N	N		Y	
15	Presque Isle Marina	Y	2	Hoists		N	Y	N	60	60	N	Y	Y	N	Y	Y	N	N	N	500 slips	Y	Y	Y	
16	East Pier	N					Y	N	0	30	N	Y	Y	N	N	N	N	N	N	N	N		Y	
17	West Pier (Channel)	Y	2	36'	15%	N	Y	N	30	80	N	Y	Y	Y	Y	N	N	N	N	N	N		Y	
18A	Long Pond	N					Y	N	0	10	N	N	N	N	N	N	N	N	N	N	N		Y	

# ERIE SHORE PUBLIC ACCESS INVENTORY (Erie)

Y = Yes  
N = No

Number	Area Name	Ramps				Parking				Fishing				Marina				Comfort Station								
		Yes/No	Number	Width	% Slope	Fee	Yes/No	Car Trailer	Car Only	Handicapped	Yes/No	Shore	Pier	Boat	Yes/No	Gas	Concession	Repairs	Boat Storage	Yes/No	Flush	Public	Private			
18B	Duck Pond	N					Y	N	N	10	N	Y	N	N	N	N	N	N	N	N	N		Y			
18C	Big Pond	N					Y	N	N	10	N	N	N	N	N	N	N	N	N	N	N			Y		
18D	Horseshoe Pond	N					Y	N	0	20	N	Y	N	N	N	N	N	N	N	N	N			Y		
19	Crystal Point	N					Y	N	0	50	N	Y	N	N	N	N	N	N	N	N	N			Y		
20	Lagoon's Boat Ramp #1	Y	1	12'	8%	N	Y	N	18	40	N	Y	Y	Y	N	N	N	N	N	N	Y	N	Y	Y		
21	Lagoon's Boat Ramp #2	Y	1	24'	14%	N	Y	N	45	20	N	Y	Y	Y	N	N	N	N	N	N	Y	N	Y	Y		
22	Stefan's Boat Livery	N					Y	N	N	30	N	Y	N	Y	N	Y	Y	N	N	N	N				Y	
23	Lawrence Parking	Y	1	12'	10%	N	Y	N	20	20	N	Y	Y	Y	N	N	N	N	N	N	N			Y		
24	Eric Yacht Club	Y	4 Hoists 1 Ramp		Y		Y	N	75	80	N	Y	N	N	Y	Y	Y	Y	Y	Y	439 Slips	Y	Y	Y	Y	



Y = Yes  
N = No

# ERIE SHORE PUBLIC ACCESS INVENTORY (Erie)

Number	Area Name	Ramps					Parking					Fishing				Marina					Comfort Station				
		Yes/No	Number	Width	% Slope	Fee	Yes/No	Fee	Car Trailer	Car Only	Handicapped	Yes/No	Shore	Pier	Boat	Yes/No	Gas	Concession	Repairs	Boat Storage	Yes/No	Flush	Public	Private	
25	Cascade St. Ramp	Y	1	45'	14%	N	Y	N	35	20	N	Y	Y	N	Y	N	N	N	N	N	N			Y	
26	Commodore Perry Yacht Club	Y	1 Lift			Y	Y	N	25	20	N	Y	N	N	Y	Y	N	Y	N 139 Slips	N	N				Y
27	Cherry St. Marina	Y	1 Lift			Y	Y	N	15	50	N	Y	N	N	Y	Y	Y	Y	Y 240 Slips	Y	Y	Y			Y
28	Bob's Wharf	N					Y	N	0	20	N	N	N	N	N	Y	Y	N	N 30 Slips	N	N				Y
29	Chestnut St. Ramp	Y	2	12'	10%	N	Y	N	40	20	N	Y	N	N	Y	N	N	N	N	N	N	N	N	Y	
30	Waterwork's Ramp	Y	1	20'	10%	N	Y	N	20	10	N	Y	Y	Y	N	N	N	N	N	N	N			Y	
31	Erie Outboard Club	Y	1	20'	10%	N	Y	N	35	10	N	Y	N	N	Y	N	N	N	N	N	N				Y
32	Erie Public Dock	N					Y	N	0	100	N	Y	Y	Y	N	N	N	N	N	N	N			Y	
33	Presque Isle Yacht Club	Y	1 Hoist				Y	N	5	10	N	Y	N	N	Y	Y	Y	Y	Y 90 Slips	N	N				Y

Y = Yes  
N = No

# ERIE SHORE PUBLIC ACCESS INVENTORY

(Erie)

Number	Area Name	Ramps				Parking					Fishing				Marina					Comfort Station				
		Yes/No	Number	Width	% Slope	Fee	Yes/No	Fee	Car Trailer	Car Only	Handicapped	Yes/No	Shore	Pier	Boat	Yes/No	Gas	Concession	Repairs	Boat Storage	Yes/No	Flush	Public	Private
34	Gem City Marina	Y	1 Hoist				Y	N	N	10	N	Y	N	N	Y	Y	Y	Y	38 Slips	N				
35	Paasch Marine	N					Y	N	4	10	N	N	N	N	Y	Y	N	N	Y	8 Slips	N			
36	West State St.	Y	1 Hoist				Y	N	On Street	N	N	Y	N	N	Y	N	N	N	N	N	N			
37	Eric Marine	Y	1 Hoist			Y 2.50 Ft.	Y	N	20	30	N	Y	N	N	Y	Y	N	N	Y	60 Slips	N			
38	Brockway Marine	Y	3 Hoists				Y	N	10	30	N	Y	Y	N	Y	Y	Y	N	Y	100 Slips	N			
39	East State St.	N					Y	N	N	On Street	N	Y	Y	N	N	N	N	N	N	N	N			
40	McAllister & Son Ltd.	Y	2 Hoists			Y 2.50 Ft.	Y	N	20	30	N	Y	N	N	Y	Y	Y	N	Y	95 Slips	Y	Y		
41	Bayshore Marine	N					Y	N	N	50	N	N	N	N	Y	Y	Y	Y	Y	75 Slips	Y	Y		
42	North & South Piers	N					Y	N	N	30	N	Y	Y	Y	N	N	N	N	N	N	N			Y

Y = Yes  
N = No

Y = Yes  
N = No

# ERIE SHORE PUBLIC ACCESS INVENTORY (East of Erie)

Number	Area Name	Ramps					Parking					Fishing				Marina					Comfort Station			
		Yes/No	Number	Width	% Slope	Fee	Yes/No	Fee	Car Trailer	Car Only	Handicapped	Yes/No	Shore	Pier	Boat	Yes/No	Gas	Concession	Repairs	Boat Storage	Yes/No	Flush	Public	Private
45	Four Mile Creek	N					N					Y	N	N	N	N	N	N	N	N	N		Y	
46	Lawrence Park Fishing Club	Y	1 Lift				Y	N	20	30	N	Y	Y	Y	Y	Y	N	N	N	55 Slips	N			Y
47	Shades Beach	Y	Rail & Dolly				Y	N	40	10	N	Y	Y	Y	N	N	N	N	N	N	Y	N		
48	Twelve Mile Creek (Shorewood)	N				N	Y	N	25	10	N	Y	Y	N	N	N	N	N	N	N	N		Y	
49	Sixteen Mile Creek	N					Y	N	30	20	N	Y	Y	N	N	N	N	N	N	N	N		Y	
50	Freeport Yacht Club	Y	1 Lift			Y	Y	N	36	50	N	N	N	N	N	Y	N	N	N	28 Slips	Y	Y	Y	
51	Charlie's Boat Livery	Y	1	16'	\$100 - Season \$1 - In \$1 - Out		Y	N	N	20	N	Y	Y	Y	Y	Y	Y	Y	N	15 Slips	Y	Y		Y
52	Orchard Beach Park Assn. Pk.	N	1 Lift				Y	N	5	5	N	Y	N	Y	N	N	N	N	N	N	N			Y

Y = Yes  
N = No

Y = Yes  
N = No

ERIE SHORE PUBLIC ACCESS INVENTORY  
(East of Erie)

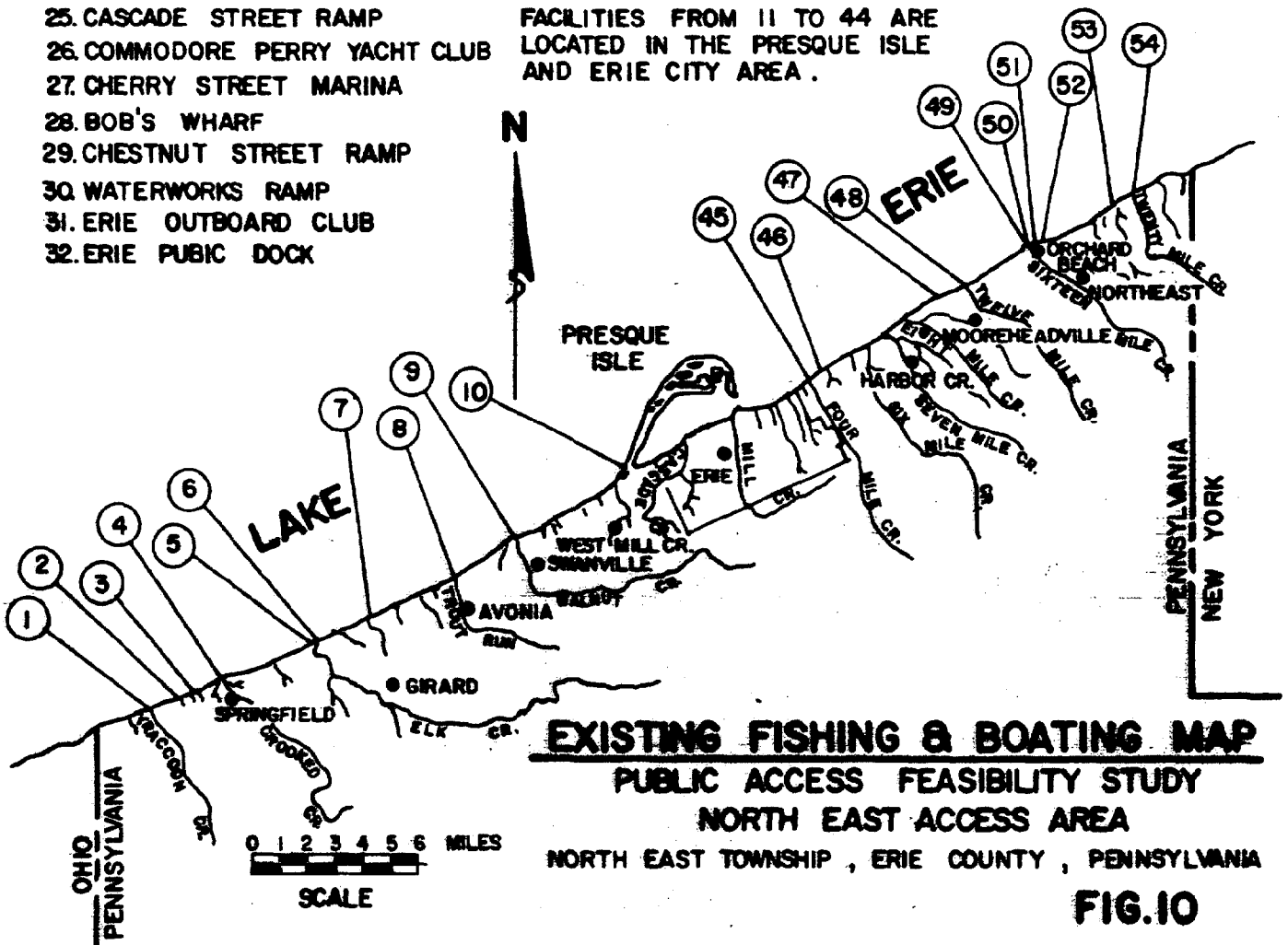
Number	Area Name	Ramps				Parking					Fishing				Marina					Comfort Station		Private		
		Yes/No	Number	Width	% Slope	Fee	Yes/No	Car Trailer	Car Only	Handicapped	Yes/No	Shore	Pier	Boat	Yes/No	Gas	Concession	Repairs	Boat Storage	Yes/No	Flush		Public	
13	Northeast Access Area	Y	1	12'	13%	N	Y	N	40	50	N	Y	N	N	Y	N	N	N	N	Y		Y		
14	Twenty Mile Creek	N					N					Y	N	N	Y	N	N	N	N	N			Y	
	TOTALS FOR EACH ITEM	6	2	28'	N/A	2	9	0	196	195	0	9	7	1	5	3	1	1	0	98	4	2	6	4
				3 Lifts																				

1. RACCOON CREEK PARK
2. EAGLEY ROAD
3. VIRGINIA'S BEACH
4. CROOKED CREEK
5. ELK CREEK WEST BANK
6. ELK CREEK EAST BANK
7. GODFREY RUN
8. TROUT RUN
9. WALNUT CREEK
10. HANSEN'S BAIT
11. WEST POINT
12. SWAN COVE
13. NIAGARA BOAT RAMP
14. FERRY SLIP
15. PRESQUE ISLE MARINA
16. WEST PIER
17. EAST PIER
18. LONG POND, DUCK POND, BIG POND & HORSESHOE POND.
19. CRYSTAL POINT
20. LAGOON'S BOAT RAMP 1
21. LAGOON'S BOAT RAMP 2
22. STEFANS BOAT LIVERY
23. LAWRENCE PARKING
24. ERIE YACHT CLUB
25. CASCADE STREET RAMP
26. COMMODORE PERRY YACHT CLUB
27. CHERRY STREET MARINA
28. BOB'S WHARF
29. CHESTNUT STREET RAMP
30. WATERWORKS RAMP
31. ERIE OUTBOARD CLUB
32. ERIE PUBLIC DOCK

33. PRESQUE ISLE YACHT CLUB
34. GEM CITY MARINA
35. PAASCH MARINA
36. WEST STATE STREET
37. ERIE MARINE
38. BROCKWAY MARINE
39. EAST STATE STREET
40. M & CALLISTER & SONS LTD.
41. BAYSHORE MARINE
42. NORTH & SOUTH PIERS
43. JOHN E. LAMPE MARINA
44. EAST AVENUE LAUNCH RAMP
45. FOUR MILE CREEK
46. LAWRENCE PARK FISHING CLUB
47. SHADES BEACH
48. TWELVE MILE CREEK (SHOREWOOD)
49. SIXTEEN MILE CREEK
50. FREEPORT YACHT CLUB
51. CHARLIE'S BOAT LIVERY
52. ORCHARD BEACH PARK ASSOCIATION PARK
53. NORTH EAST ACCESS AREA (DEWEY ROAD BOAT LAUNCH)
54. TWENTY MILE CREEK

**NOTE:**

FACILITIES FROM 11 TO 44 ARE LOCATED IN THE PRESQUE ISLE AND ERIE CITY AREA.



Site

The primary reasons supporting further development of the existing access area on this site are its location, the area's need for public access facilities, and the site's public ownership, recreational zoning and immediate availability.

The location is readily accessible to local and non-local users from main highways and it lies approximately half way between Erie and Barcelona, N.Y. where the greatest need for safe access to the Pennsylvania waters of Lake Erie exists. Interest from the Erie Down Riggers, Inc. (Correspondence No. 13), illustrates public support for greater public access development east of Erie.

The site is presently zoned and used as a public recreational facility and no changes are anticipated. Because of its public ownership, a redevelopment project could be implemented at an early date as no land acquisition efforts or land use zoning changes would be necessary.

The difficulties of access development at this site are common to most shorefront lands east of Erie. They are: 1. Existing high bluffs; 2. Shallow lake water depths; 3. Rough fast-moving storms on the lake; 4. The prevailing northwest winds, which at times causes a set-up, that is a tide-like phenomenon which can raise water elevations 2 to 3 feet on the east end of the lake; 5. Possible beach accretion to the west and depletion to the east of any structure in the lake which may cause maintenance expense; and, 6. Channel dredging which may

be needed at the breakwater entrance to maintain adequate water depth also may cause a continual maintenance expense. The small, intermittent stream which diagonally crosses the property is the only site specific disadvantage. Final design of the facility may dictate some change in alignment of this small watercourse.

Some site specific details which should be incorporated into any redevelopment design are: (1) A new entrance should be built from Pa. Traffic Route 5 and the present routing of traffic down Dewey Road and east on Old Lake Road to the site should be eliminated. This may require abandonment of the existing road from the west boundary of the site eastward, and will help alleviate traffic nuisances to residents west of the site, (2) Relocation of the existing gas line along Old Lake Road; and, (3) Consolidation of electrical and telephone lines crossing the property onto one pole line or to an underground system; (4) Protection and/or relocation of the existing stream and its banks and flood plains; (5) Stabilization of the lake shoreline adjacent to the bluff where required; (6) Possible provision of an alternate water supply source for the adjacent property west of the site; (7) Fencing and landscaping of the site to provide visual and noise barriers for neighboring properties and to control unwarranted trespass by site visitors..

With proper consideration of the specific points discussed in this segment, the site was found to contain no significant obstacles to development.



### Redevelopment Options

During the course of this study several possible redevelopment options were reviewed and considered as follows:

- Option 1. Discontinue use and dispose of the property.
- Option 2. Operate the property as is.
- Option 3. Provide minimum improvement including low cost shore protection with additional parking.
- Option 4. Construct a harbor by excavation of existing land form.
- Option 5. Construct a breakwater and appurtenant facilities.

Option 1 is not feasible because it is contrary to the public need and interest. Instead of creating or enhancing recreational opportunities consistent with the rationale of its original purchase by the Pennsylvania Fish Commission this option would eliminate all present benefits in an area where demonstrated need for more opportunities exists.

Option 2 is feasible but does not resolve the problem even though it presently provides some recreational benefit. It does not offer adequate parking and safe boat launching and retrieval. Current maintenance costs are high while rough water and storm debris deposited in the launching facilities limits full operation of the facility for extended periods of time.

Option 3 is not feasible without providing suitable protection for safe retrieval, and will encourage additional useage of a potentially unsafe facility. Maintenance costs would continue to be high.

Option 4 is not feasible for two major reasons. First, the cost of excavation of the 20-30 foot high bluff and the underlying rock would be prohibitive. Engineering estimates show the cost of excavation to be in excess of \$800,000. When the cost of the channel protective devices are included, estimates exceed \$2,000,000. Secondly, excavation would decrease the area available for parking and other development and increase the need for other costly structural improvements. This option might be feasible if the property was considerably larger.

Option 5 is the most feasible and desirable action because a breakwater is necessary to provide the basic protection needed to assure safe and adequate boat launching and retrieval. Initial construction of an adequate breakwater will provide the greatest protection and facilitate the construction of all other appurtanant facilities.

The following methods of breakwater construction were considered:

1. Bin wall construction.
2. Sheet piling.
3. Rubble mound.
4. Hexagonal concrete blocks.

Method 1 - bin wall construction is the process of placing steel boxes into the lake and filling them with material. This method is suitable at this site but is undesirable because of its high cost.

Method 2 - sheet piling piers consist of parallel rows of steel sheet pilings driven into the earth and filled with material. This method is infeasible because the underlying rock strata is too near the substrate surface to permit adequate penetration by the pilings.

Method 3 - rubble mound consists of a mound rubble sized rock capped by armor rock, which is weather-resistant rock of several thousand pounds each. The use of this method is desirable but is economically prohibitive due to the transportation distance involved.

Method 4 - Precast concrete hexagonal blocks are man-made concrete units of hexagonal form which can be pinned in place in a pattern. The Pennsylvania Fish Commission's prior experience with this construction method at the Walnut Creek Access Area has proven to be very satisfactory. This method will provide the required protection for the least expense.

Some additional advantages of this type of breakwater are as follows:

1. The units are relatively easy to replace, adjust or modify if a change or replacement is desired.
2. The units provide a stable footing for fisherman and equipment access.
3. The units provide improved fish habitat.
4. Materials may be locally obtained in necessary quantities.

This study is based on the use of concrete blocks of the same size and shape which were proven effective and economical at the Walnut Creek Access Area. Final engineering design may require use of higher strength materials and changes in the

configuration and size of some or all of these units, but the costs are not expected to vary greatly.

Cost Comparison of Breakwaters Constructed at  
Walnut Creek Access Area

<u>Item No.</u>	<u>Classification</u>	<u>Binwall (1980 Costs)</u>	<u>Rubble Mound (1980 Costs)</u>	<u>Precast Hex Units</u>
1.	Dredging, Type A	\$ 44,552.00	\$ 44,552.00	
2.	Steel for Binwall	92,928.00		
3.	Stone Chips to 100 lb.		93,170.00	
4.	Core Stone	12,872.00	38,614.00	
5.	Cover Stone, 4-5 ton		140,723.00	
6.	Cover Stone, 7-10 ton		269,491.00	
7.	PDH #4	60,984.00		
8.	Concrete Deck	16,335.00		
9.	2" W.I. Pipe	5,760.00		
10.	Construction			\$185,093.00
11.	Placement			<u>49,907.00</u>
	Sub Total	\$233,431.00	\$586,550.00	\$235,000.00
	Design	\$ 15,500.00	\$ 38,947.00	\$ 15,604.00
	Inspection	<u>\$ 11,695.00</u>	<u>\$ 29,386.00</u>	<u>\$ 11,774.00</u>
	Total	\$260,626.00	\$654,883.00	\$262,378.00
	Lineal Feet of Wall	161.84	285	330.46
	Cost/Lineal Foot	\$ 1,610.00	\$ 2,298.00	\$ 794.00

### Harbor Design

The harbor opening is proposed to face east, since easterly winds occur only 4.8% of the time. This orientation should provide the greatest protection from storms and sedimentation in the launching area and harbor mouth.

The configuration of the harbor area is planned so that there is a long beach to dissipate the energy of the waves. Also this scheme provides the maximum protected water area with the least length of breakwater. Rip-rap will be used in the harbor area to protect the built-up roadway and launching ramp. Rip-rap may also be necessary to the east of the harbor for shore protection. The amount of shore protection required and the final configuration of the harbor opening are to be determined by careful design. If the Division of Coastal Zone Management office within the Department of Environmental Resources is successful in its efforts to develop a predictive computer model for the placement of shoreline structures, it may be helpful in selection of final structure locations and configurations (See letter C-11).

### Design Alternatives

These alternatives, including the construction of a breakwater, launch ramp, toilet facilities, parking lots and service roads, were developed to provide basic facilities at the least cost. The heights of the various breakwater structures were based upon the average lake level of 572.5 feet.

#### Alternative 1

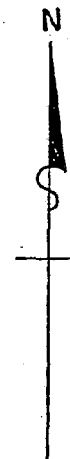
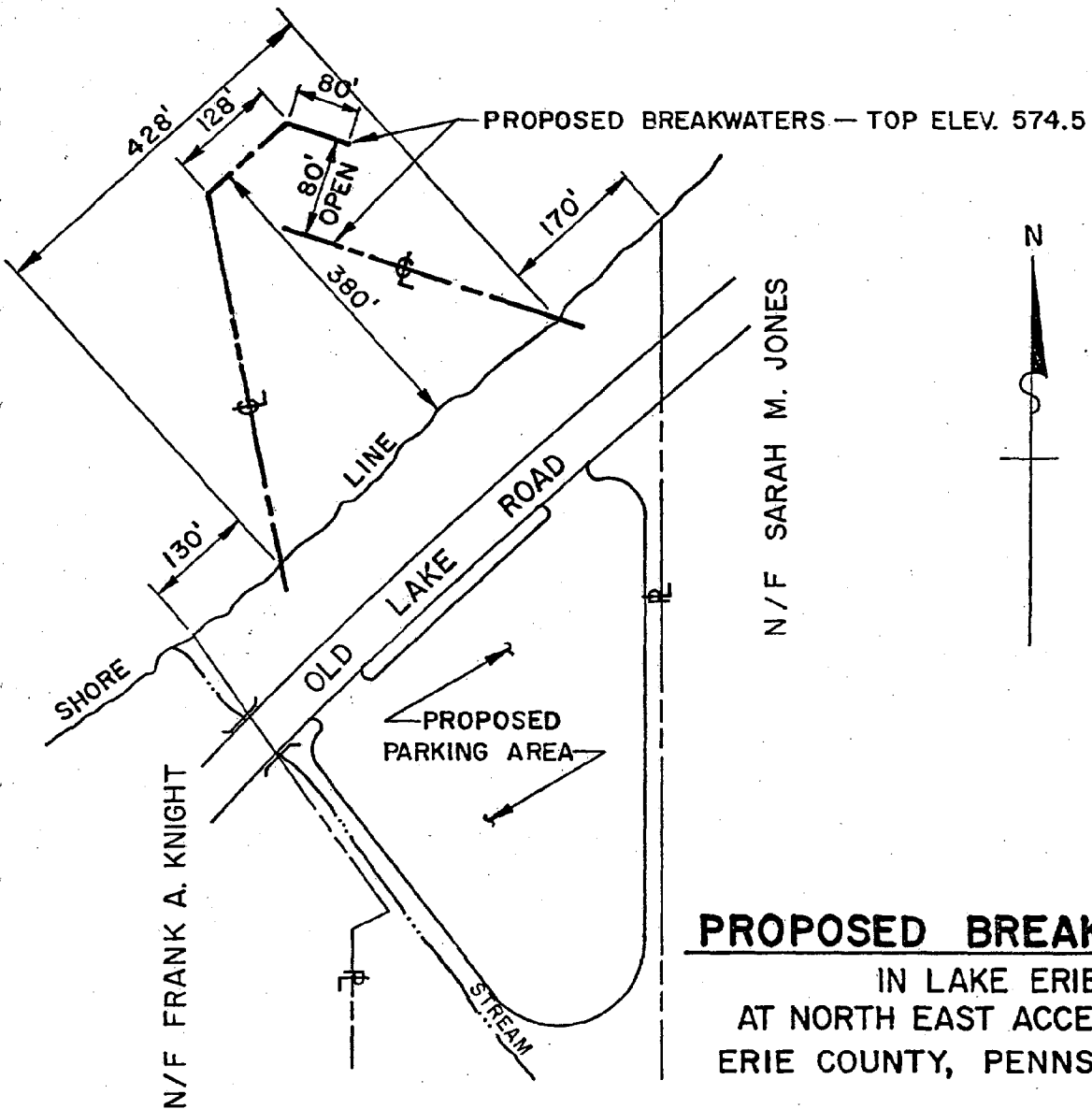
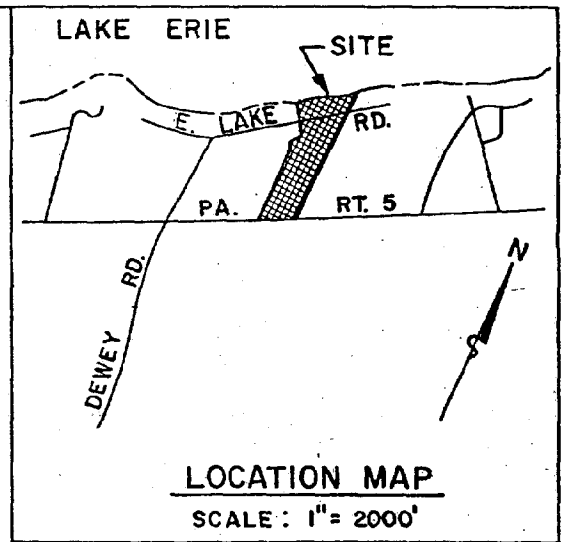
Breakwater with a top elevation of 574.5 feet (USGS) including a launching ramp, roads and parking. This alternative will provide improved launching facilities during low winds. See Page 51 and Illustration A-1.

#### Alternative 2

Breakwater with a top elevation of 576.5 feet (USGS) including launching ramp, roads and parking. This alternative will provide improved protection and use over alternative 1 during moderate winds, but will be more costly to construct. See Page 52 and Illustration A-2.

#### Alternative 3

Breakwater with a top elevation of 578.5 feet (USGS) including a launching ramp, roads, parking plus mooring facilities with floating docks. This scheme will provide greater protection for launching and retrieving during higher winds, and will be the more costly of these three alternatives. See Page 53 and Illustration A-3.



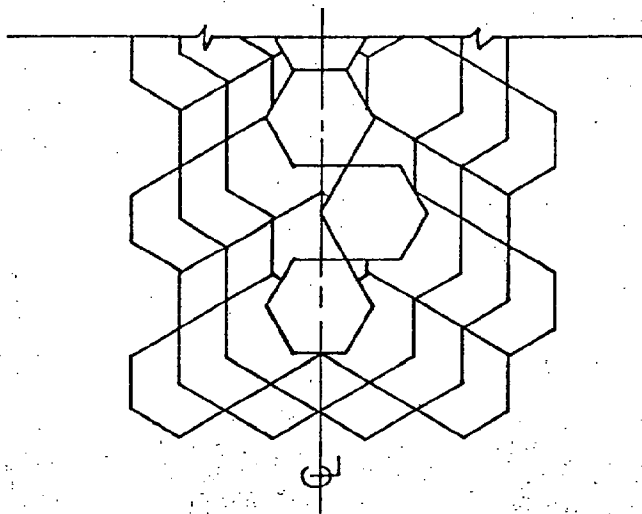
**PROPOSED BREAKWATERS**  
 IN LAKE ERIE  
 AT NORTH EAST ACCESS AREA  
 ERIE COUNTY, PENNSYLVANIA

**SITE PLAN  
 ALTERNATIVE I**

0' 50' 100' 150' 200'

SCALE: 1" = 200'

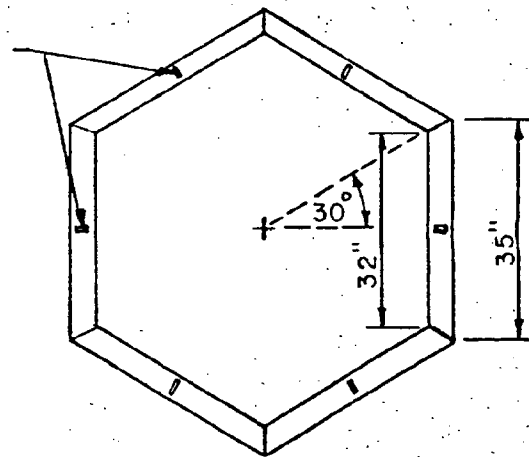




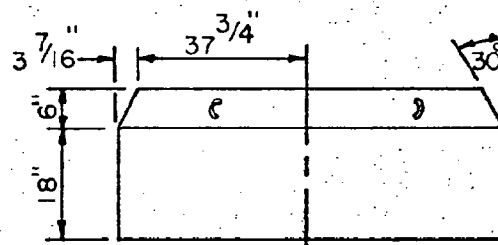
**PLAN OF BREAKWATER**

SCALE: 1" = 10'

LIFTING  
HOOKS



**PLAN**

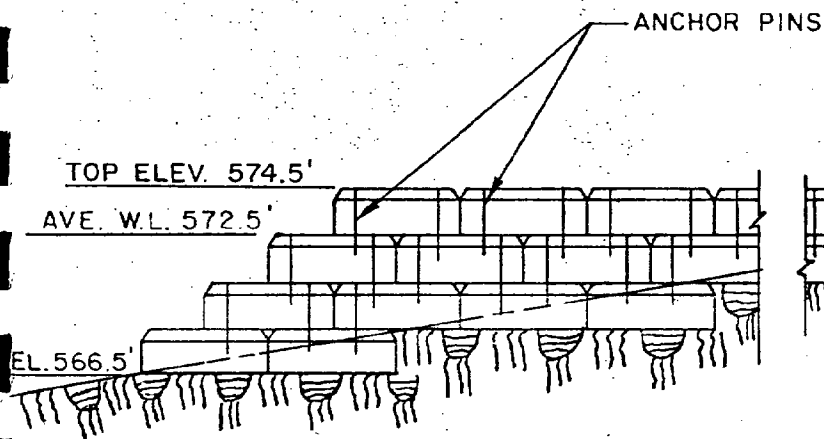


**ELEVATION**

**SHORE PROTECTION BLOCK**

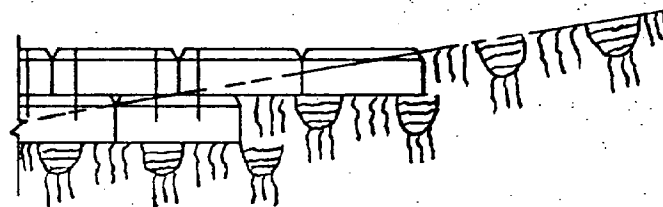
SCALE: 3/8" = 1'-0"

ORIGINAL GROUND



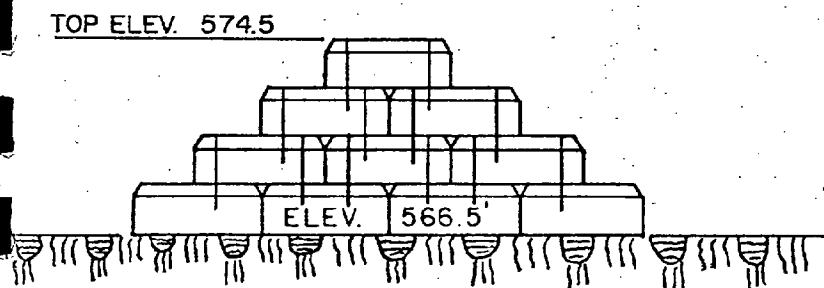
**ELEVATION OF BREAKWATER**

SCALE: NONE



NOTE:

ANCHOR PINS ARE 1" DIA. x 2'-0" LG  
DEFORMED REF. BARS DROPPED  
INTO 1 1/2" DIA. DRILLED HOLES  
AFTER BLOCKS ARE IN PLACE.  
DRILL 1'-0" INTO BOTTOM BLOCK.



**TYPICAL CROSS SECTION**

SCALE: 1/8" = 1'-0"

**PROPOSED BREAKWATER**

IN LAKE ERIE

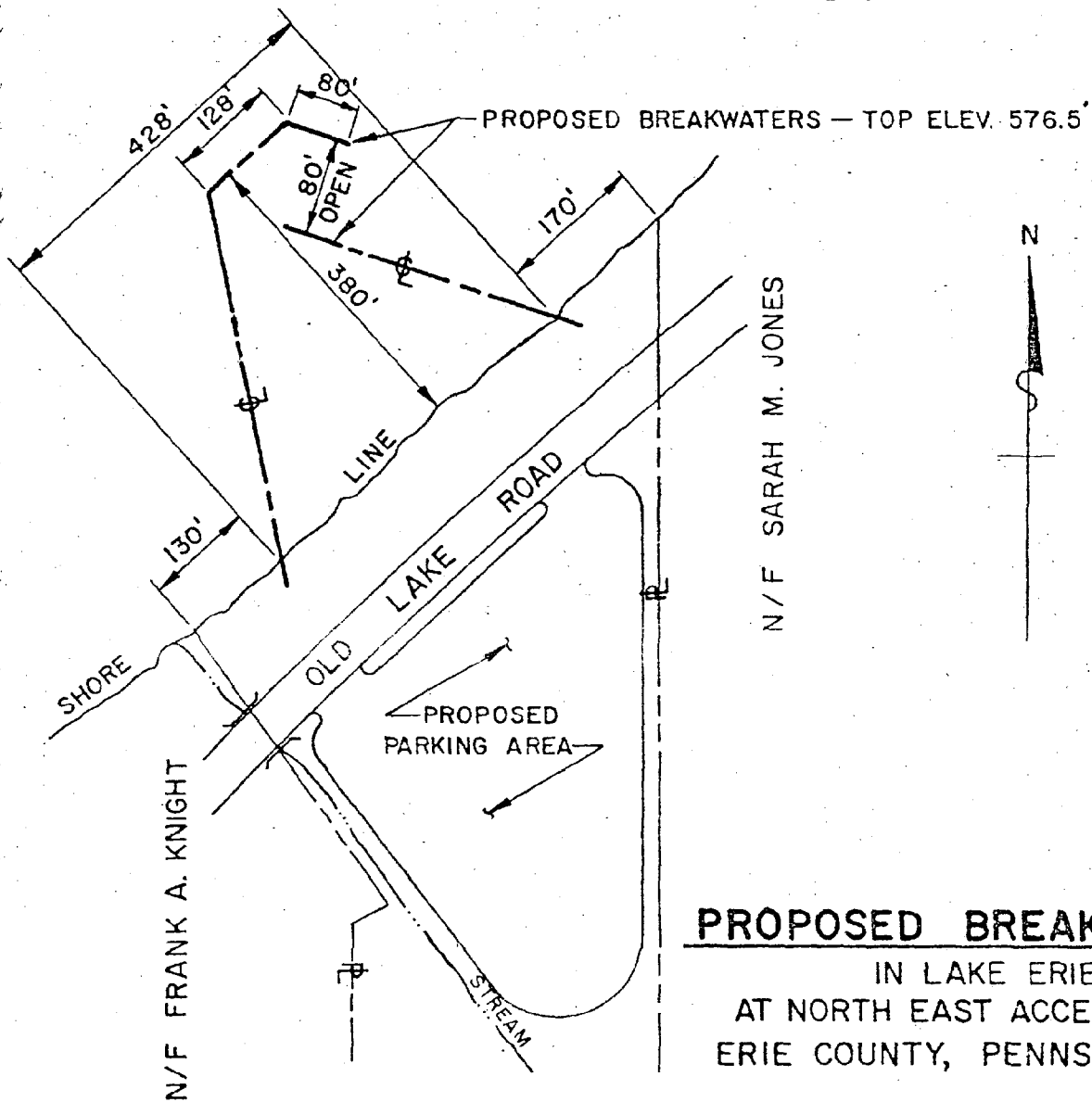
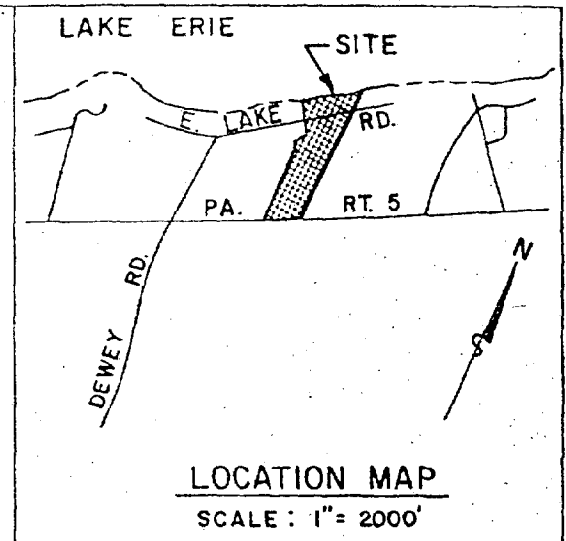
AT NORTH EAST ACCESS AREA  
ERIE COUNTY, PENNSYLVANIA

**ALTERNATIVE 1**

Alternative 1

Cost Estimate

Breakwater	1760 Units @ \$250/unit =	\$ 440,000
Excavation and Fill		
	10,000 yd <sup>3</sup> @ \$2.50/yd <sup>3</sup> =	25,000
Access Road and Parking		
	30,000 sy @ \$10.00/sy =	300,000
Launch Ramp =		50,000
Rip Rap =		24,000
Landscaping =		26,000
Fencing =		75,000
Restroom =		75,000
Electrical =		<u>12,000</u>
	Sub Total	\$1,027,000
Contingency		<u>256,750</u>
	Total	\$1,283,750

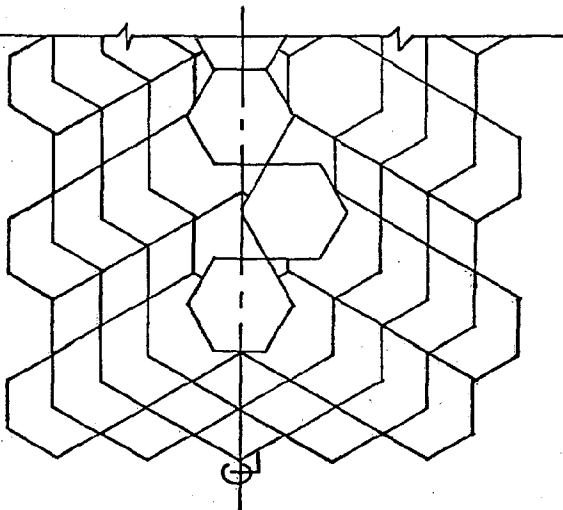


**PROPOSED BREAKWATERS**  
 IN LAKE ERIE  
 AT NORTH EAST ACCESS AREA  
 ERIE COUNTY, PENNSYLVANIA

**SITE PLAN**  
**ALTERNATIVE 2**

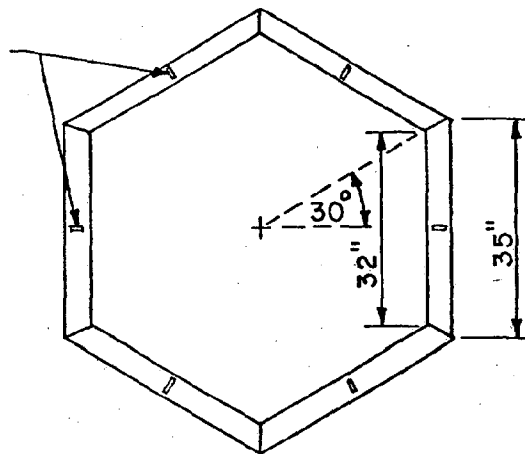
0' 50' 100' 150' 200'

SCALE : 1" = 200'

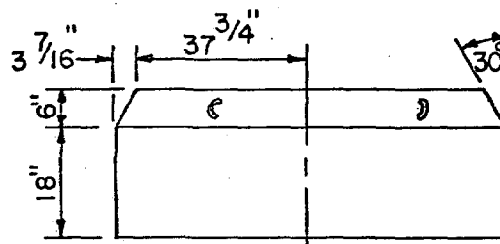


**PLAN OF BREAKWATER**  
SCALE: 1"=10'

LIFTING  
HOOKS



**PLAN**

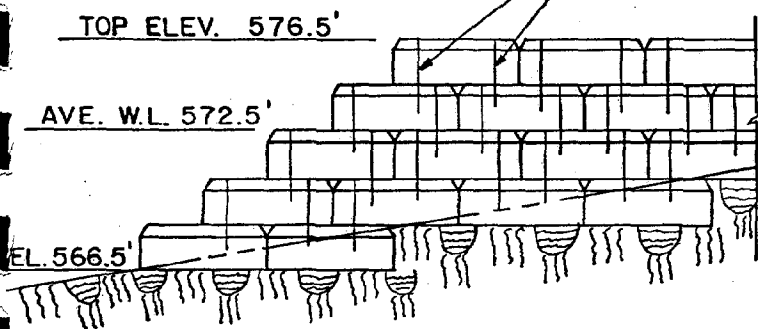


**ELEVATION**

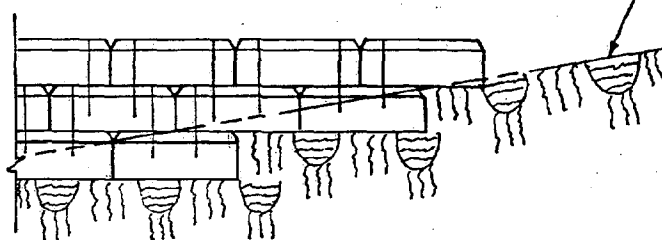
**SHORE PROTECTION BLOCK**  
SCALE: 3/8"=1'-0"

ANCHOR PINS

ORIGINAL GROUND

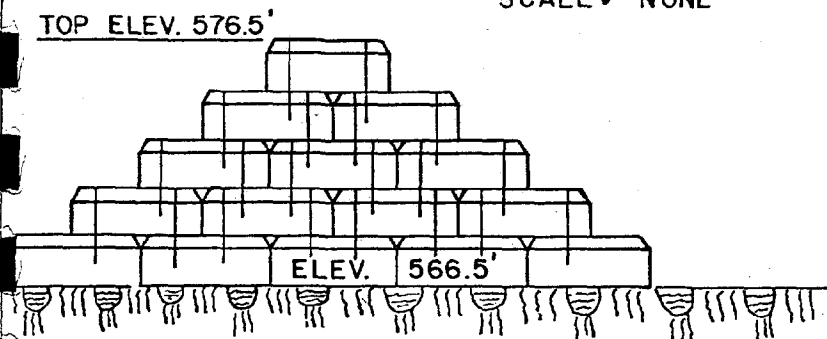


**ELEVATION OF BREAKWATER**  
SCALE: NONE



NOTE:

ANCHOR PINS ARE 1" DIA. x 2'-0" LG  
DEFORMED REF. BARS DROPPED  
INTO 1 1/2" DIA. DRILLED HOLES  
AFTER BLOCKS ARE IN PLACE.  
DRILL 1'-0" INTO BOTTOM BLOCK.



**TYPICAL CROSS SECTION**  
SCALE: 1/8"=1'-0"

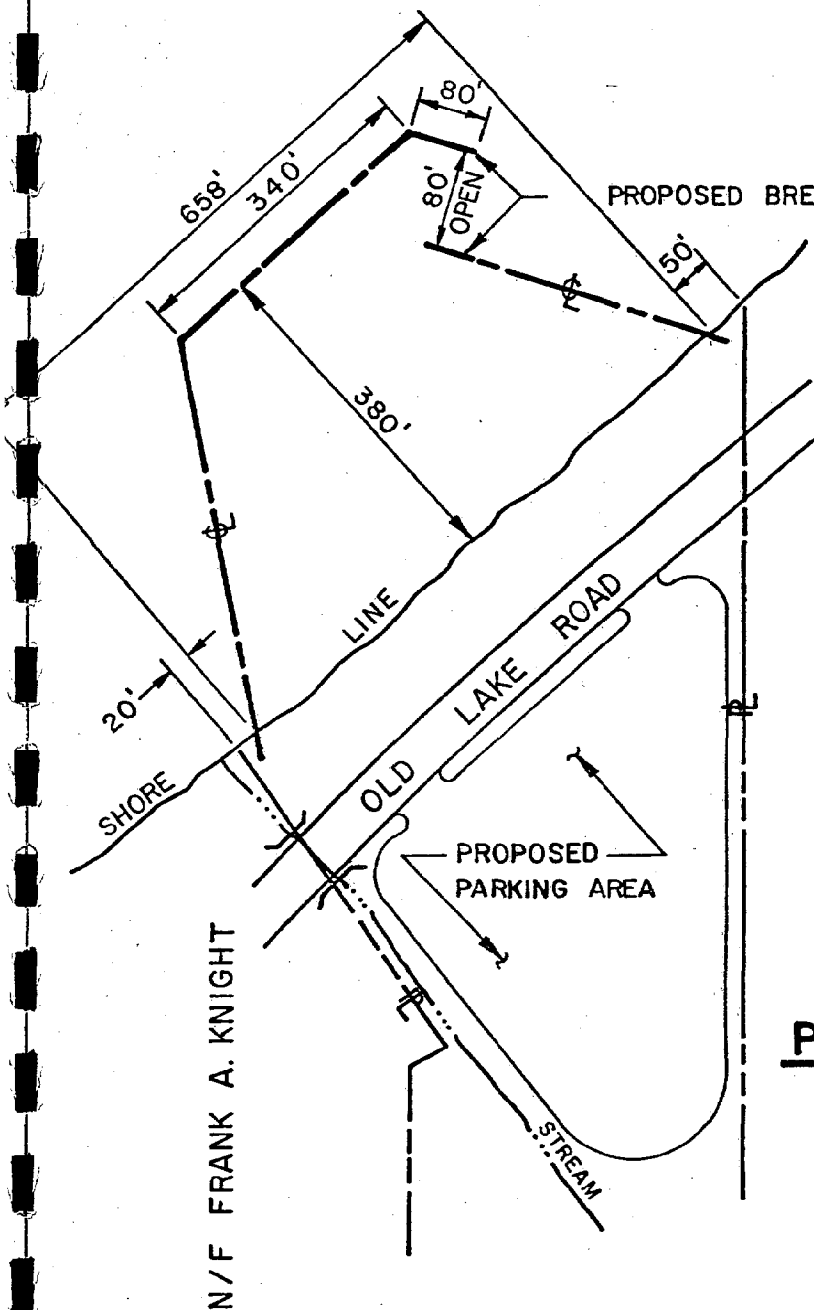
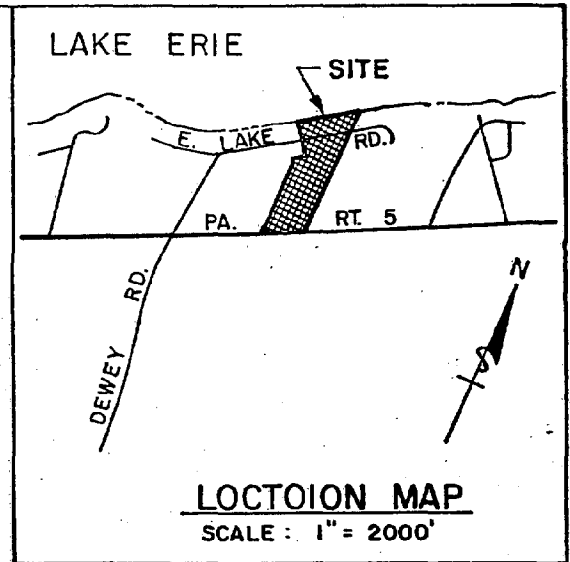
**PROPOSED BREAKWATER**  
IN LAKE ERIE  
AT NORTH EAST ACCESS AREA  
ERIE COUNTY, PENNSYLVANIA

**ALTERNATIVE 2**

Alternative 2

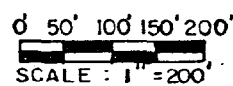
Cost Estimate

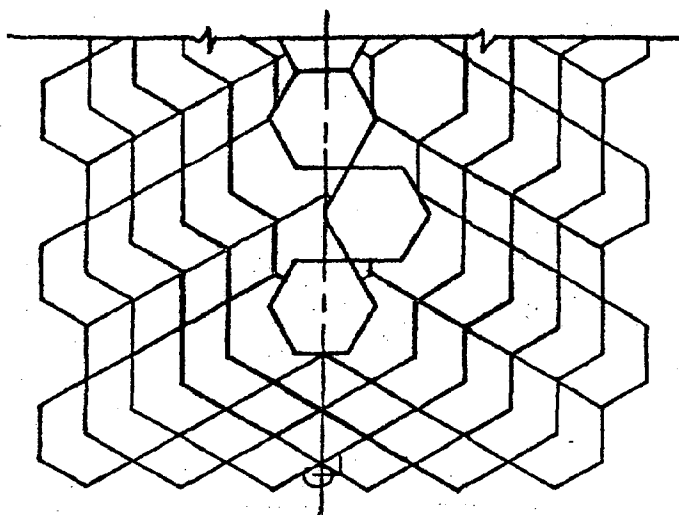
Breakwater	2712 units @ \$250/unit =	\$ 678,000
Excavation and Fill		
	10,000 yd <sup>3</sup> @ \$2.50/yd <sup>3</sup> =	25,000
Access Road and Parking		
	30,000 sy @ \$10.00/sy =	300,000
Launch Ramp =		50,000
Rip Rap =		24,000
Landscaping =		26,000
Fencing =		75,000
Restroom =		75,000
Electrical =		<u>12,000</u>
	Sub Total	\$1,265,000
Contingency		<u>316,250</u>
	Total	\$1,581,250



**PROPOSED BREAKWATERS**  
 IN LAKE ERIE  
 AT NORTH EAST ACCESS AREA  
 ERIE COUNTY, PENNSYLVANIA

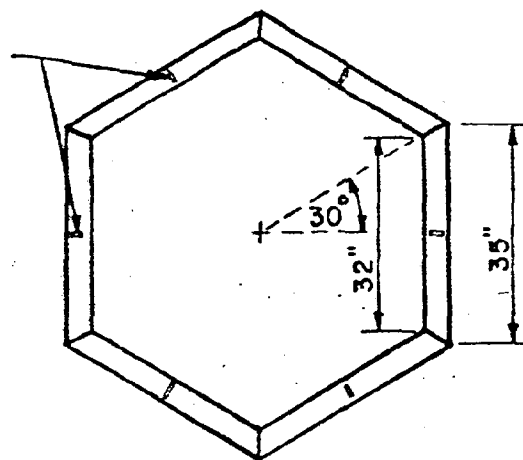
**SITE PLAN**  
**ALTERNATIVE 3**



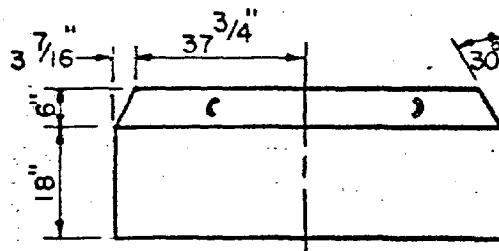


**PLAN OF BREAKWATER**  
SCALE: 1" = 10'

LIFTING  
HOOKS



**PLAN**



**ELEVATION**

**SHORE PROTECTION BLOCK**  
SCALE: 3/8" = 1'-0"

ANCHOR PINS

TOP ELEV. 578.5'

AVE. W.L. 572.5'

ELEV. 566.5'

**ELEVATION OF BREAKWATER**  
SCALE: NONE

ORIGINAL GROUND

NOTE:

ANCHOR PINS ARE 1" DIA. x 2'-0" LG.  
DEFORMED REF. BARS DROPPED  
INTO 1 1/2" DIA. DRILLED HOLES  
AFTER BLOCKS ARE IN PLACE.  
DRILL 1'-0" INTO BOTTOM BLOCK.

TOP ELEV. 578.5'

ELEV. 566.5'

**TYPICAL CROSS SECTION**  
SCALE: 1/8" = 1'-0"

**PROPOSED BREAKWATER**  
IN LAKE ERIE  
AT NORTH EAST ACCESS AREA  
ERIE COUNTY, PENNSYLVANIA

**ALTERNATIVE 3**

Alternative 3

Cost Estimate

Breakwater	4371 units @ \$250/unit =	\$1,092,750.00
Excavation and Fill		
10,000 yd <sup>3</sup> @ \$2.50/yd <sup>3</sup> =		25,000.00
Access Road and Parking		
30,000 sy @ \$10.00/sy =		300,000.00
Launch Ramp =		50,000.00
Rip Rap =		24,000.00
Landscaping =		26,000.00
Fencing =		75,000.00
Restroom =		75,000.00
Electrical =		12,000.00
Underwater Excavation		
6400 yd <sup>3</sup> @ \$24/yd <sup>3</sup> =		153,600.00
80 (16' to 20') Boat Slips @ \$1550/slip =		<u>124,000.00</u>
Sub Total		\$1,957,350.00
Contingency		<u>489,337.50</u>
Total		\$2,446,687.50



These alternatives were submitted to the U.S. Army Corps of Engineers District office in Buffalo for their review and comment. A summary of their analysis, which is appended to this report, is as follows:

Neither Alternative 1 or 2, as proposed, would provide adequate protection for safe boat launching and retrieval under storm conditions. Alternative 3 would provide basic protection for launching and retrieval but not for mooring. It is been calculated that a breakwater with a top elevation of 584.5 feet (USGS) would be necessary to provide adequate protection for mooring and docking facilities.

Two additional alternatives were developed following the Corps of Engineers' review. These alternatives are:

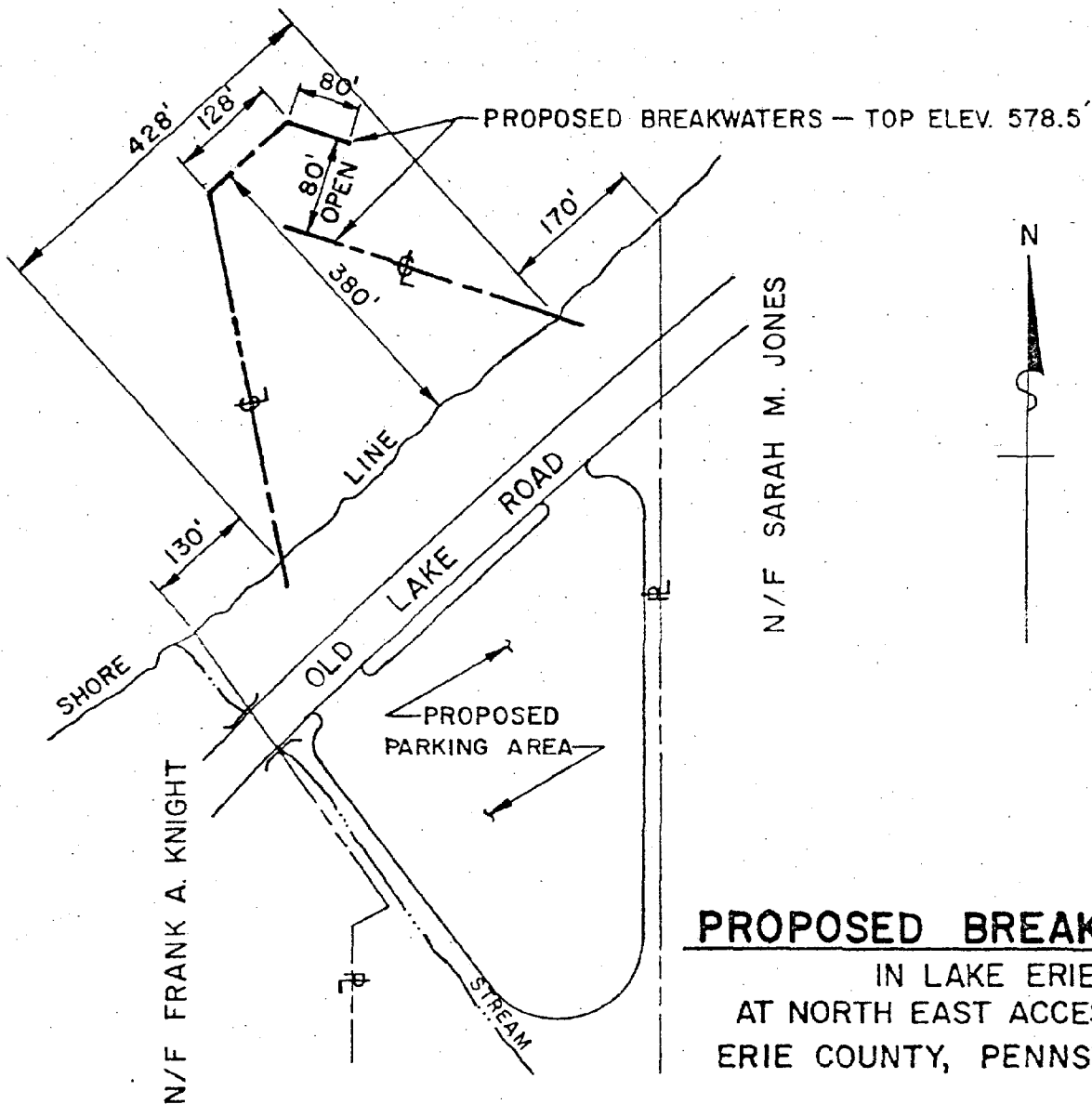
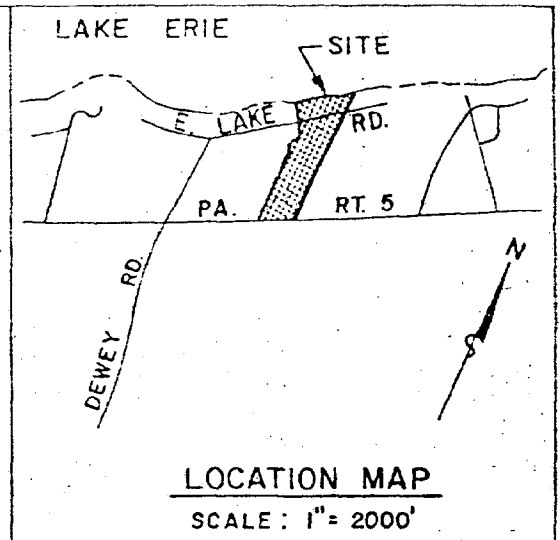
Alternative 3 Modified

Breakwater with a top elevation of 578.5 feet (USGS) including a launch ramp, roads and parking. This scheme would provide protection for safe launching and retrieval during high winds, but does not include mooring. See Page 56 and Illustration A-3M.

Alternative 4

Breakwater construction to top elevation of 584.5 feet (USGS), including a launch ramp, roads, parking, mooring facilities and floating docks for 80 boats. This scheme would provide the necessary protection required for mooring. Accordingly this alternative is the most costly. See Page 57 and Illustration A-4.

The investigation of the additional costs required to provide the mooring facilities included under this alternative reveals an estimated cost of \$30,000 per boat slip. At the current fee structures used in the Erie area, this cost would not be amortized for nearly 100 years. Therefore, providing small boat mooring in a facility of this size is not economically feasible. To gain economic feasibility for boat mooring would require greatly enlarging the size of the mooring basin and would involve acquisition of additional land which would expand the scope of this alternative beyond the intent of this study.

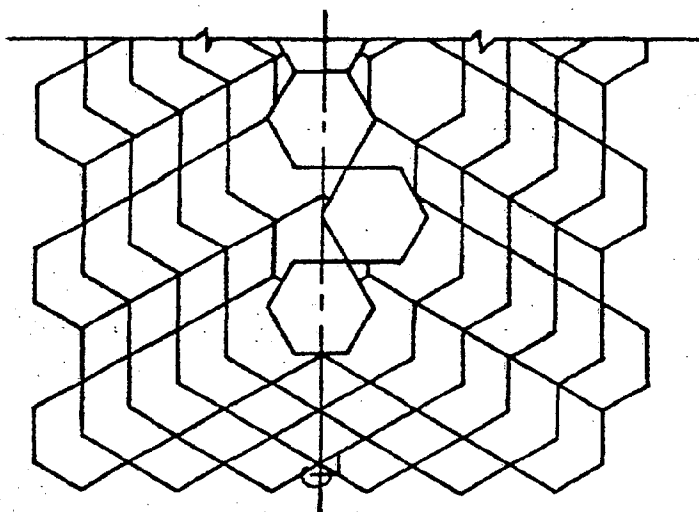


**PROPOSED BREAKWATERS**  
 IN LAKE ERIE  
 AT NORTH EAST ACCESS AREA  
 ERIE COUNTY, PENNSYLVANIA

**SITE PLAN**  
**ALTERNATIVE 3 MODIFIED**

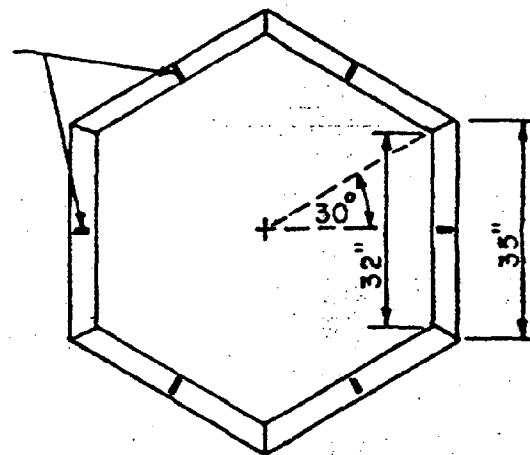
0' 50' 100' 150' 200'

SCALE : 1" = 200'

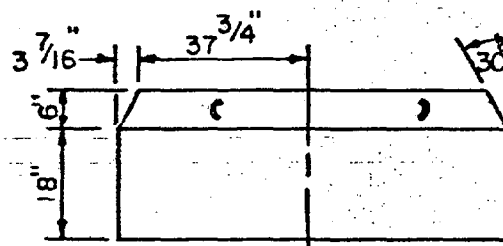


**PLAN OF BREAKWATER**  
SCALE: 1"=10'

LIFTING  
HOOKS

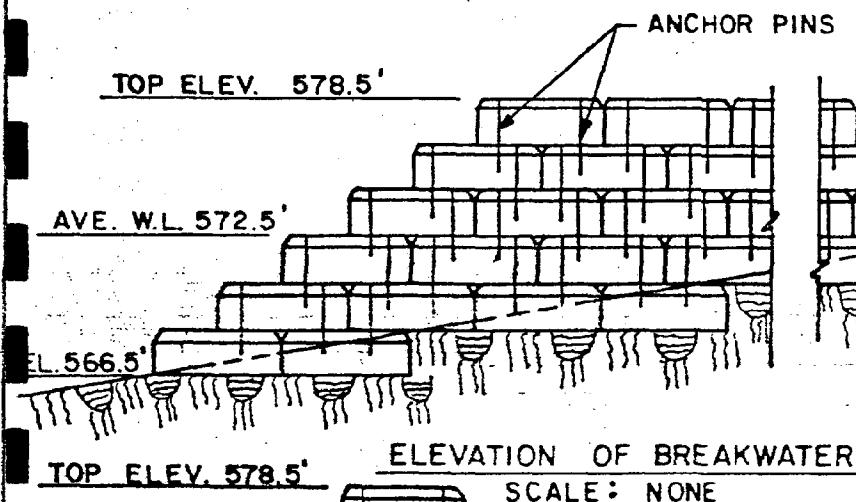


**PLAN**

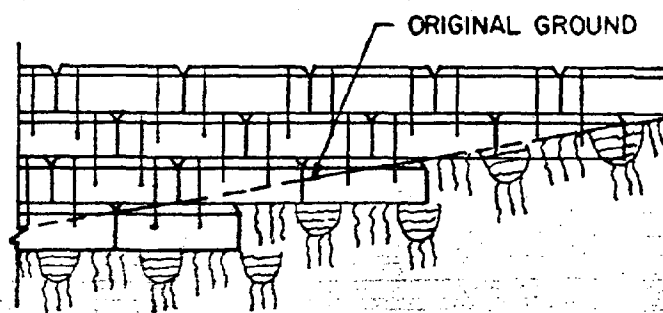


**ELEVATION**

**SHORE PROTECTION BLOCK**  
SCALE: 3/8"=1'-0"

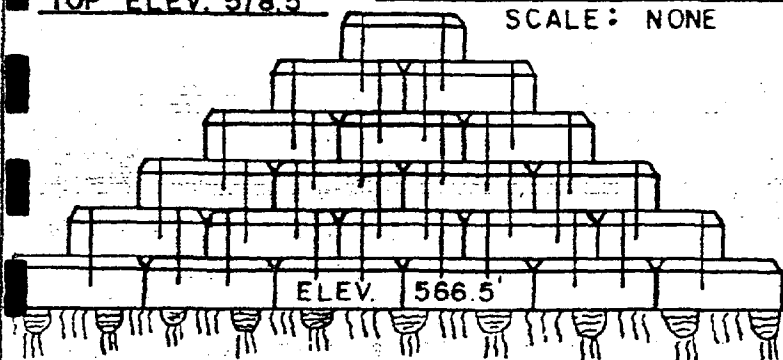


**ELEVATION OF BREAKWATER**  
SCALE: NONE



**NOTE :**

ANCHOR PINS ARE 1" DIA. x 2'-0" LG.  
DEFORMED REF. BARS DROPPED  
INTO 1 1/2" DIA. DRILLED HOLES  
AFTER BLOCKS ARE IN PLACE.  
DRILL 1'-0" INTO BOTTOM BLOCK.



**TYPICAL CROSS SECTION**  
SCALE: 1/8"=1'-0"

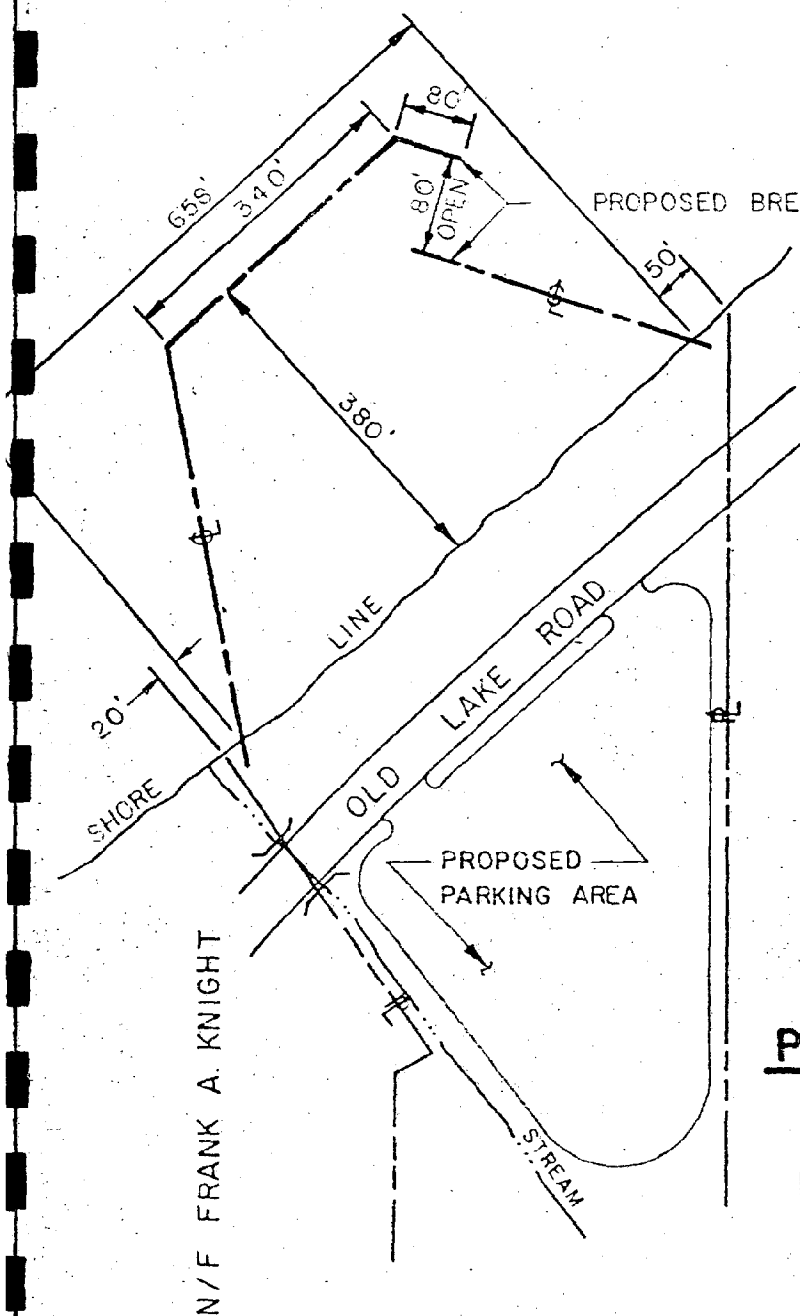
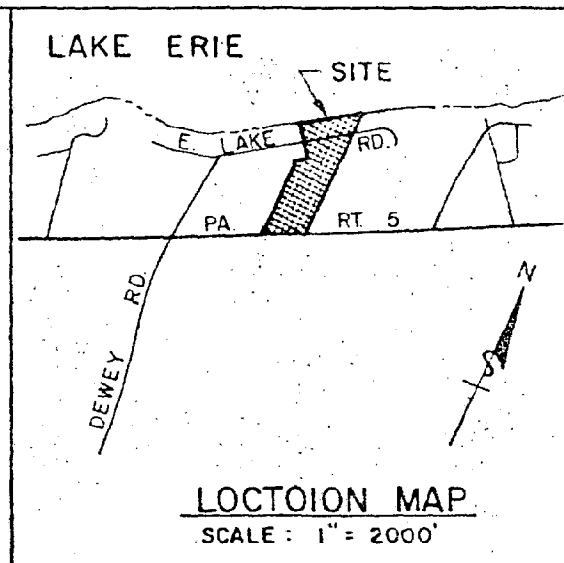
**PROPOSED BREAKWATER**  
IN LAKE ERIE  
AT NORTH EAST ACCESS AREA  
ERIE COUNTY, PENNSYLVANIA

**ALTERNATIVE 3 MODIFIED**

Alternative 3 Modified

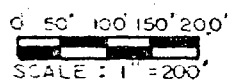
Cost Estimate

Breakwater	3750 units @ \$250/unit =	\$ 937,500
Excavation and Fill	10,000 yd <sup>3</sup> @ \$2.50/yd <sup>3</sup> =	25,000
Access Road and Parking	30,000 sy @ \$10.00/sy =	300,000
Launch Ramp =		50,000
Rip Rap =		24,000
Landscaping =		26,000
Fencing =		75,000
Restroom =		75,000
Electrical =		<u>12,000</u>
Sub Total		\$1,524,500
Contingency		<u>381,125</u>
Total		\$1,905,625



**PROPOSED BREAKWATERS**  
 IN LAKE ERIE  
 AT NORTH EAST ACCESS AREA  
 ERIE COUNTY, PENNSYLVANIA

**SITE PLAN  
 ALTERNATIVE 4**

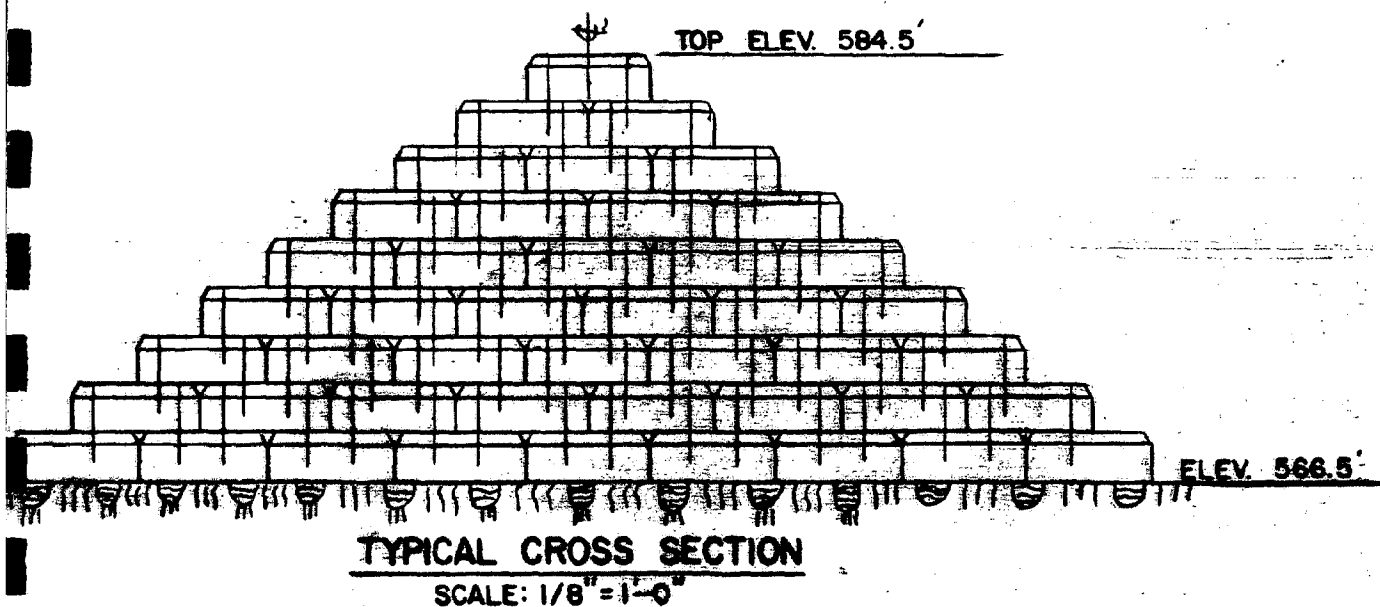
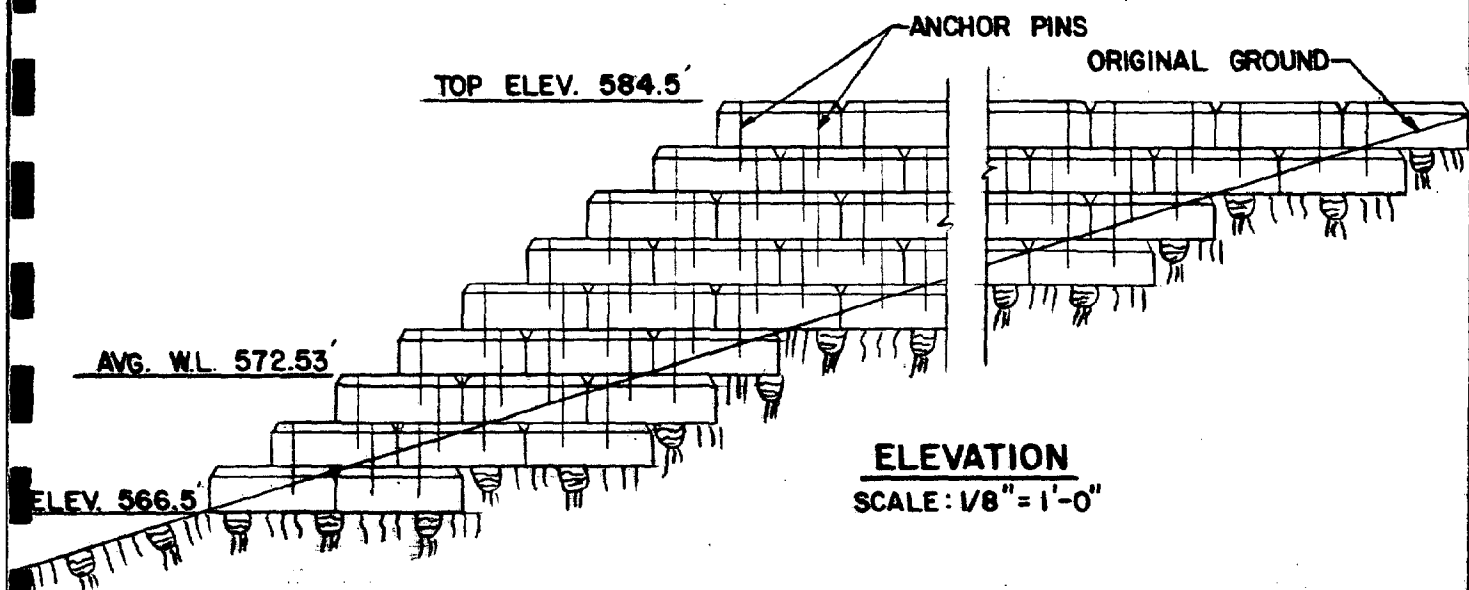


# PROPOSED BREAKWATERS

IN LAKE ERIE  
AT NORTH EAST ACCESS AREA  
ERIE COUNTY, PENNSYLVANIA

## ALTERNATIVE 4

SHEET 2 OF 2



Alternative 4

Cost Estimate

Breakwater	10,500 units @ \$250/unit =	\$2,625,000
Excavation and Fill	10,000 yd <sup>3</sup> @ \$2.50/yd <sup>3</sup> =	25,000
Access Road and Parking	30,000 sy @ \$10.00/sy =	300,000
Launch Ramp =		50,000
Rip Rap =		24,000
Landscaping =		26,000
Fencing =		75,000
Restroom =		75,000
Electrical =		12,000
Underwater Excavation	6400 yd <sup>3</sup> @ \$24/yd <sup>3</sup> =	153,600
80 (16' to 20') Boat Slips @ \$1550/slip =		<u>124,000</u>
Sub Total		\$3,489,600
Contingency		<u>872,400</u>
Total		\$4,362,000



Table 3 Summary of Alternatives

<u>Alternative</u>	<u>Break Water Elevation</u>	<u>Estimated Cost</u>	<u>Capacity</u>		<u>Safety</u>	
			<u>Parking</u>	<u>Slips</u>	<u>Launching/ Retrieval</u>	<u>Mooring</u>
1.	574.5	\$1,283,750	283	0	No	No
2.	576.5	1,581,250	283	0	No	No
3.	578.5	2,446,687	283	80	Yes	No
3. Modified	578.5	1,905,625	283	0	Yes	No
4.	584.5	4,362,000	283	80	Yes	Yes

### Recommended Project Development

#### Project Analysis

To address the economical feasibility of the redevelopment of the study site, a table was prepared (see Table 4) which compares 5 similar areas. These areas include two sites which are completed projects, Walnut Creek, and Lampe Marina; two sites which are also study proposals, Twenty Mile Creek and Elk Creek; and Alternative 3 Modified of this study. In the table, both the specific amenities and the resultant costs are listed side by side for comparative purposes. Also, all costs are shown in terms of 1980 dollars. Conversions were made with information obtained from R. S. Means and McGraw Hills's Dodge Construction Estimating Services.

Because each project is different in terms of the quantity of facilities it provides, the costs of two basic units were analyzed. The first was the parking space which provides an index to the quantity of users to be accommodated. As can be seen in the table, the project cost divided by the number of parking spaces provided is equal to \$5,386.00. This is the second lowest rate shown, indicating that on a comparative basis, this project should be a good value.

The second unit used was the boat launch lane which provides an index to the quantity of boats that can be launched or retrieved simultaneously. When the total project cost is divided by the number of launch ramp lanes provided, again the study proposal ranks second in cost. This comparison, together with the parking space unit costs indicates that the Alternative 3 Modified Project is economically feasible.

TABLE 4. COST COMPARISON PER PARKING SPACE AND LAUNCH RAMP LANE OF LAKE ERIE ACCESS SITES  
(Dollar Figures in 1980 Dollars)

Site Name	Elk Creek	Walnut Creek	Lampe Marina	Twenty Mile Creek	North East (Alt. 3 Mod.)
<u>Site Description</u>					
Ramp Lanes	1	6	4	4	6
Ramp Width	12 feet	80 feet	70 feet	60 feet	80 feet
Length of Road	1,400 feet	1,450 feet	1,500 feet	1,400 feet	1,590 feet
No. of Parking Spaces	100	297	192	130	283
Comfort Facilities	yes	yes	yes	yes	yes
Breakwater	yes	yes	yes	yes	yes
Lighting	yes	yes	yes	yes	yes
<u>Reference</u>	D.A. Johnson & Assoc., Corry Study Estimated Cost	P.F.C. files Final Con- tract Cost	P.F.C. files Final Contract Cost	Hill & Hill Engi- neers, Inc., North East Study Estimated Cost	P.F.C. Estimated Cost
<u>Work Item</u>					
Access Road & Parking	\$206,150	\$375,700	\$192,580	\$296,000	\$ 413,575
Comfort Facilities	\$ 84,740	\$203,150	\$190,450	\$ 15,000	\$ 75,850
Lighting	\$ 1,200	\$ 55,700	\$ 22,290	\$ 7,500	\$ 12,150
Boat Launching Ramp	\$ 30,740	\$ 41,500	\$114,400	\$220,800	\$ 74,800
Channel Improvements	\$ 31,970	\$ 30,400		\$110,700	
Breakwaters	\$221,400	\$763,000	\$1,360,800	\$772,450	\$ 948,000
Total Cost	\$576,200	\$1,469,450	\$1,880,520	\$1,422,450	\$1,524,375
Cost Per Launch Ramp Lane	\$576,200	\$ 244,908	\$ 470,130	\$ 355,612	\$ 254,062
Cost/Per Parking Space	\$ 5,762	\$ 4,948	\$ 9,794	\$ 10,942	\$ 5,386

### Sanitary Facilities

Sanitary facilities can be provided near the parking area and boat ramp. These facilities can be located in a single structure with separate usage areas for men and women. They could be equipped with flush waste facilities, and a sink with cold running water only. Since a public water supply is not available at the site, a low yield well with treatment and distribution system should be developed.

Heaviest use of the proposed sanitary facilities is expected on weekends during the summer and fall, with peaks during the salmon fishing season in late summer and early fall.

For design purposes we estimate a maximum average daily use of 750 persons.

The following minimum number of fixtures are recommended for the public restrooms:

Men:	1 Flush toilet in closed booth
	2 Urinals
	2 Sinks
Women:	3 Flush toilets in closed booths
	2 Sinks

Because public sewerage facilities are not currently available and on-lot disposal is not a viable alternative, for purposes of this study sanitary facilities could be housed in a self-contained trailer unit, including vacuum pump and holding tank. The contents of the holding tank would be periodically emptied and removed to a facility approved by the Erie County Department of Health.

Phasing

Phase I

The first phase should be the construction of the breakwater. The blocks for the breakwater can be either precast by a manufacturer or cast on site. Placement of the blocks will provide the quiet water necessary for launching and retrieving and protection for the construction of the launch ramp in Phase II.

Phase II

The second phase should consist of the clearing, grubbing, excavation and grading of the access road parking area and boat ramp. This would be followed by installation of the concrete boat launching ramp and construction of all roads and parking areas. Completion of the project would consist of stabilizing berms, the construction of an entrance gate, adding topsoil and seeding of disturbed areas, landscaping, fencing, adding comfort stations and installing necessary guard rails, signs and other appertances.

### Operation and Maintenance

After completion of construction and opening the facilities to the public an active maintenance program will be implemented. Maintenance costs could be shared by North East Township and the Pennsylvania Fish Commission. It is proposed that the daily operation and maintenance duties such as cleaning the comfort station, grass cutting, opening and closing the gate and policing be assumed by North East Township. Annual operation and maintenance duties such as opening in the spring, maintaining the navigational channel, the launch ramp, floating docks, pavement, and closing in the late fall would be the responsibility of the Pennsylvania Fish Commission.

Total maintenance and operational costs could fluctuate considerably due to a large number of unknown variables. However, from the Commission's experience with such facilities as those at Walnut Creek, it is reasonable to anticipate average annual maintenance and operating costs of approximately \$25,000.

### User Conflicts

The Fish Commission's experience has shown that the only significant conflict between boaters and shore fishermen occurs at times of maximum activity for both uses. At other facilities this has only been a problem during salmonid season. Since there are currently no significant salmonid runs close to the shore and into the stream crossing this site, we see no specific potential user

conflicts. Should user conflicts occur after development we are confident that they can be adequately controlled by use of existing regulatory and enforcement authority.

Schedule

For the project to proceed to construction, a source of funding has to be obtained. This could then be followed by engineering design and preparation of construction drawings and specifications. The appropriate permits could then be secured as necessary from the federal, state and local governments.

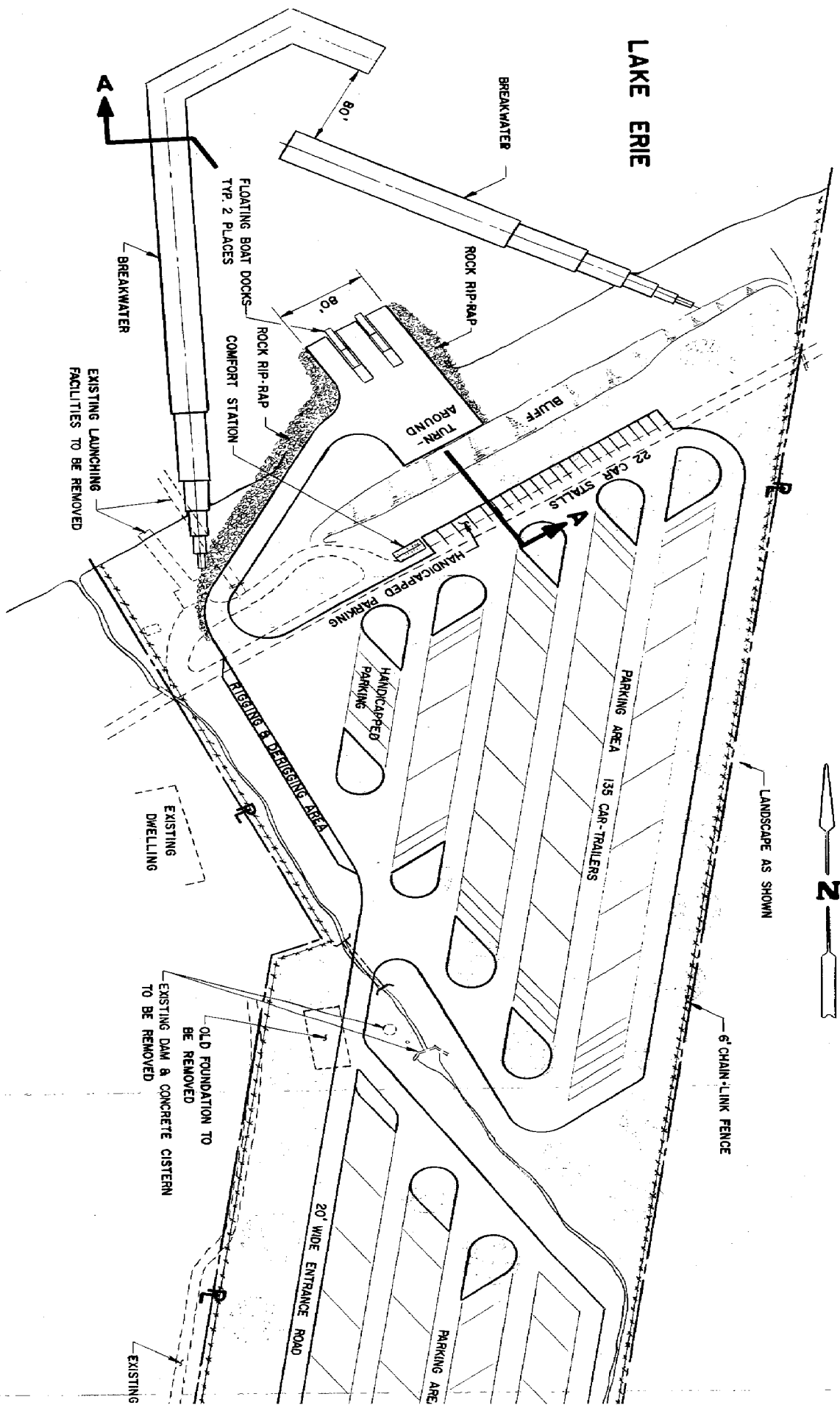
A proposed schedule for these events is as follows:

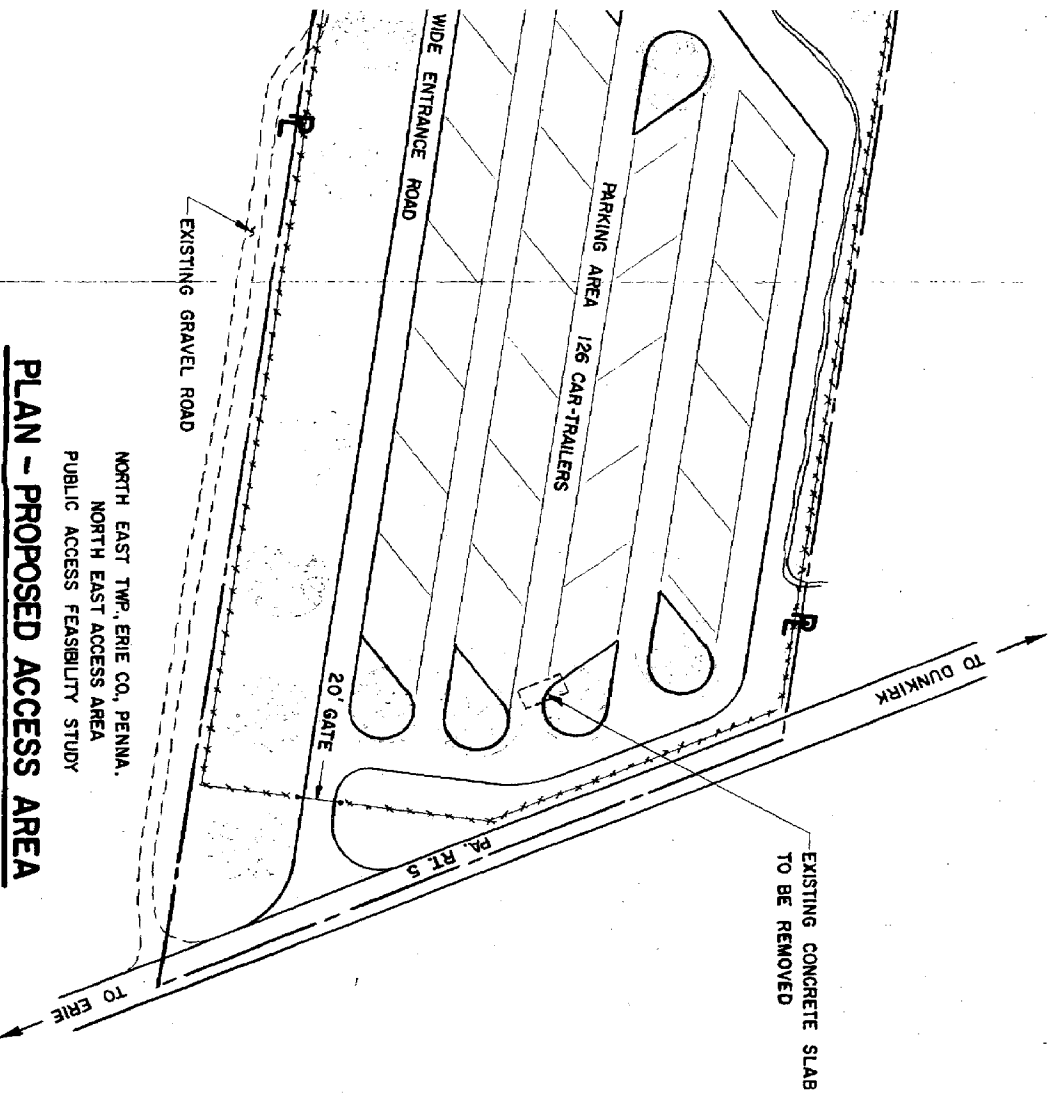
Completion of Engineering Design, Construction Drawings, Specifications and Permit Applications - 10 months after funding is secured.

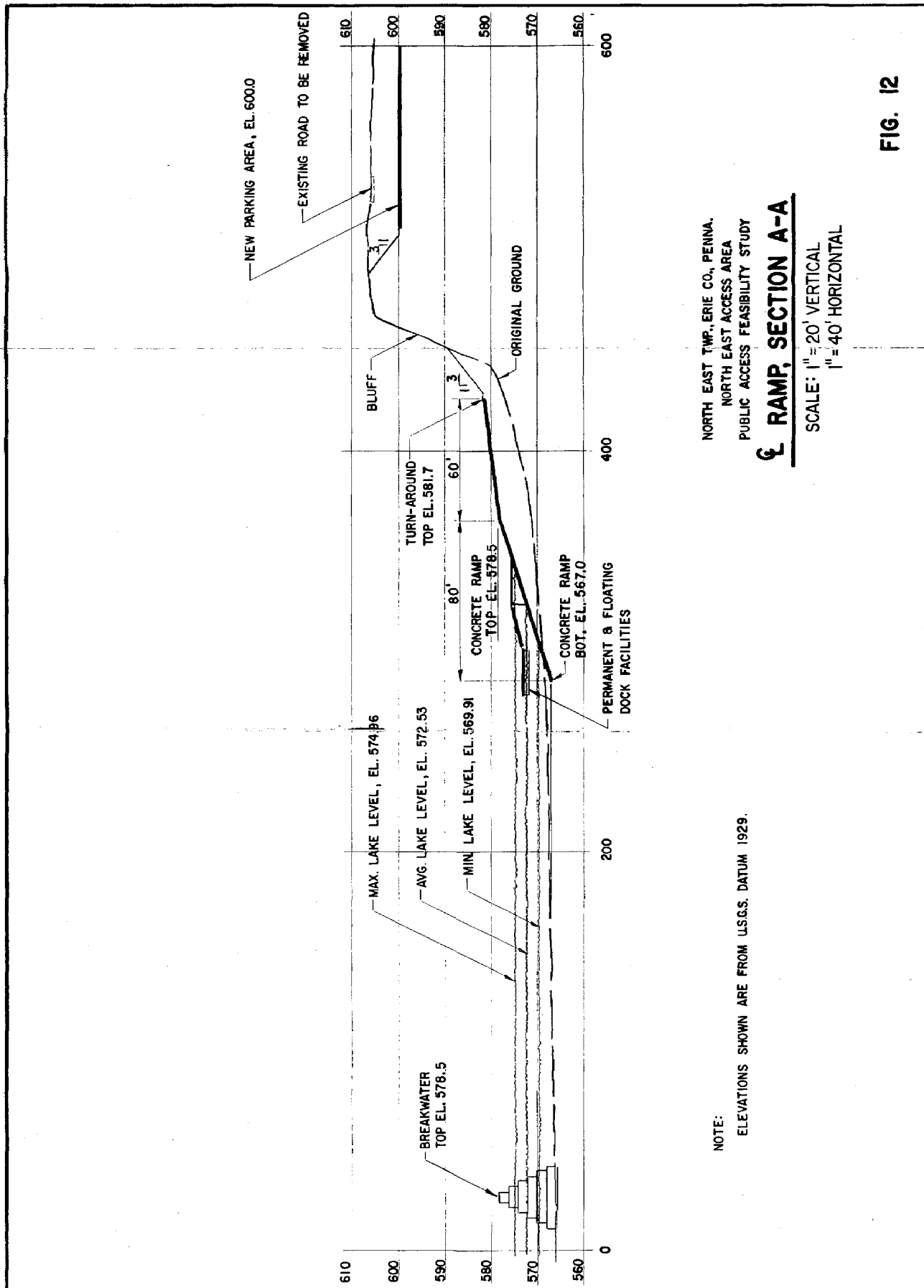
Construction Completion Phase I - 18 months after completion of Engineering and Issuance of Permits

Construction Completion Phase II - 18 months after completion of Phase I









### Funding

The results of this study have emphasized what the Commission strongly suspected that a substantial, well designed lake access project is financially viable and important and deserves to be given high priority. However, there currently is insufficient funding available within the Pennsylvania Fish Commission's development budget to initiate it. Even if the project were spread out or phased over several fiscal years, the Commission could not afford to fund the total development without funding assistance from other sources.

Sources which could provide financial assistance are as follows:

#### Federal

Coastal Zone Management administered through D.E.R.

Coastal Energy Impact Program administered through the Department of Community Affairs.

National Park Service, Land & Water Conservation Fund  
administered through D.E.R.

#### State

Department of Environmental Resources (See Administrative Functions above)

State Legislature

#### Local

Erie County

Township of North East (Recreation boro/township function possibly involved in maintenance.)

Cost Estimate

Phase I

Construction of Precast Concrete Hexagonal Blocks for Breakwater

3750 units @ \$150 = \$ 562,500

Grading, Placing and Pinning of the Precast Concrete Hexagonal Blocks  
for Breakwater

= \$ 375,000

Phase II

Excavation and Fill

10,000 yd<sup>3</sup> @ \$2.50/yd<sup>3</sup> = 25,000

Access Road and Parking

30,000 sy @ \$10/sy = \$ 300,000

Grading

6" Stone Base

2" Bituminous Base

1-1/2" ID-2 Wearing Course

Concrete Boat Launch Ramp

\$ 50,000

Cofferdam Water Control

and Floating Docks

Rip Rap Shore and Ramp Protection including Filter Cloth

600 tons @ \$40/ton = \$ 24,000

Grading, Seeding, Plantings, Guardposts, Signs, Lines, and Curbing

\$ 26,000

Fencing including Entrance Gate

\$ 75,000

12' x 28' Rest Room Facilities

\$ 75,000

Electrical

\$ 12,000

Phase I & II Sub Total

\$1,524,500

Engineering, Legal, Fiscal,  
Administrative and Contingency

\$ 381,125

Total

\$1,905,625

### Conclusion

This study has found, both through inventory and analysis as well as the review of other current studies, that a strong need for additional boating access facilities exists. The options for improving the existing facility have been reviewed. Construction methods and design alternatives have been investigated; the physical feasibility of these proposals have been analyzed; and, a scheme that is physically valid and workable has been selected. The costs necessary to develop and maintain the proposed facility were examined and found to be reasonable when compared with other similar development costs.

Other important facts are: 1. The study site is currently under public ownership; 2. No further property acquisition is required; 3. The proposed use is the same as the current use and involves only an increase in the level of that use; 4. The land is presently zoned recreational.

These facts and findings lead to the conclusion that this site offers definite potential to provide needed boating and fishing facilities on Lake Erie. Therefore, steps should be actively taken to obtain funding for redevelopment of this site.

### Bibliography

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Erie County Department of Planning. North East Regional Comprehensive Plan Update, Pennsylvania Coastal Zone Management Program, 1982.

Erie Downriggers. Ramp Study Report Erie Downriggers.

Gaythwaite, John. The Marine Environment and Structural Design, Van Nostrand Reinhold Company, 1981.

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Young, Leroy and Robert Lahr. Lake Erie Angler and Boater Use and Angler Harvest Survey, Pennsylvania Coastal Zone Management Program, 1982.

JAMES R. STEADMAN  
DOUGLAS J. WRIGHT  
ATTORNEYS AT LAW  
24 MAIN STREET EAST  
GIRARD, PENNSYLVANIA 16417  
—  
TELEPHONE (814) 774-2628

March 29, 1983

REFER TO:

James R. Steadman

Mr. Richard M. Mulfinger, P.E.  
Commonwealth of Pennsylvania  
Pennsylvania Fish Commission  
Special Projects  
Robinson Lane  
Bellefonte, Pennsylvania 16823

RE: Proposed North East/Lake Erie Access Area

Dear Mr. Mulfinger:

Please be advised that I represent Sarah (Jeannie M. Jones) and John P. Lantzy, who own and reside in the property located at 11986 East Lake Road, North East, Pennsylvania, which is adjacent to the proposed North East/Lake Erie Access Area.

On their behalf, I would like the Fish Commission's records regarding this proposed project to show that they are unalterably opposed to this project. Since the purchase of the property by Mr. and Mrs. Jones prior to his death in 1975, there has been a continuous and severe problem with vandalism and boisterous behavior on the part of those who are using the present facilities at the site. My clients have repeatedly contacted everyone from the Director of the Pennsylvania Fish Commission to their State Representative to their local municipal authorities to the State Police, as well as officers of the Pennsylvania Fish Commission, without any success whatever of abating the nuisance created by the improper behavior of those who are using the facility. My clients are aware that this proposed access area will be a public park and that it will undoubtedly attract even greater numbers of people to the area. Their concerns are compounded by the fact that there are young children residing in their home who have been repeatedly exposed to improper behavior on the part of those using the premises, including drinking, use of drugs, noisy parties and general rowdiness.



Mr. Richard Mulfinger, P.E.

Page 2

March 29, 1983

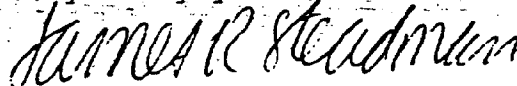
Our second area of concern is that of the beach erosion which will almost certainly occur to my clients' property, which is located to the east of the proposed development. One only has to look at the Walnut Creek Access Area in the western part of Erie County to see what happens when a development of this size is undertaken. The beach areas immediately to the east of the development are seriously eroded. In addition to beach areas, the banks and bluffs along the lake have been the victims of erosion.

The third area of concern is that the construction of jetties or breakwaters causes the area behind or to the east of the jetties or breakwaters to become foul, mucky and filled in with seaweed because of the lack of free circulation of the water along the beach. The odor and health hazards are considerable. The problem is further compounded by the multitude of people who will use the access area and upon returning will dump their waste materials upon my clients' property or into water which will eddy in behind the breakwater, resulting in a dirty, malodorous mess on their property.

Another concern is that the lake bluff will be cut down to make the access easier. This cannot but have an adverse effect upon my clients' property and property values.

Again, let us state our opposition to the proposed development. Please inform us prior to taking any further action on this matter.

Very truly yours,



James R. Steadman

JRS/lar

CC: Harry Bowser

Buzz Andrezeski

Mr. and Mrs. John P. Lantzy

Statement presented to the North East Recreation Commission - June 1, 1983

RE: Proposed Dewey Road Access Area improvements - North East, Pa.

1. The proposed improvements will attract greater numbers of people to the area. Neighboring private properties and residents will need to be protected from the flow of people and the resulting increase of current problems - vandalism, improper and boisterous behavior and improper disposal of waste materials.
2. According to information from LOW COST SHORE PROTECTION published by the Army Corps of Engineers the construction of breakwaters and/or jetties will certainly cause unpredictable erosion to the beaches east (downdrift) of the access area. The existing erosion problems will only be compounded by the construction of breakwaters or jetties at the access area resulting in further deterioration of usable beach front and property values of private property.
3. Again referring to the above publication the natural flow of water will be impeded resulting in the accumulation of debris, seaweed, dead fish and improperly disposed of waste material. This will cause odorous, mucky and hazardous water conditions which will pose a health hazard and deteriorate the aesthetic appeal of the beach area.
4. Excessive use of the limited land site at the Dewey Road Access Area will further destroy the ecological balance.

The signatures below indicate that the property owners are opposed to the construction of breakwaters and/or jetties and the cutting back of the banks at the Dewey Road Access Area. We also request that we are informed of all proceedings and their results and are further give the opportunity for public input. We also request copies of all information currently available and copies of all future information and results.

Audrey Jordan 11988 E Lake Rd.

Francis Jones Parly 11986 E Lake Rd.

John P. Parly 11986 E LAKE RD.

Michael P. McCay 11992 18 mile lane

James H. Allum Jr. 11994 18 mile lane Spier

Gilly M. Aldum 18 Mile Lane

Frank A. Hought 11941 DEWEY RD.

CC: Richard Mullfinger, Harry Bowser, Buzz Andrezeski, Coastal Zone Management, Army Corps of Engineers.

Rita Amann 228-18 mile lane NORTH EAST, PA.

Don Amann 228-15 " " " "



814-358-2754

COMMONWEALTH OF PENNSYLVANIA  
PENNSYLVANIA FISH COMMISSION  
Bureau of Fisheries and Engineering

Robinson Lane  
Belleville, PA 18823

C-3

July 13, 1983

Mr. James R. Steadman  
Attorney at Law  
24 Main Street East  
Girard, Pennsylvania 16417

Dear Mr. Steadman:

In regard to your clients' concerns expressed in your letter of March 29, 1983, and the subsequent statement presented to the North East Recreation Commission on June 1, 1983, we wish to clarify the matter in question.

The activity to which your clients refer as a "proposed access area" and that to which the signers of the June 1, 1983, statement refer as the "Proposed Dewey Road Access Area Improvements," is not a proposal as such. What actually is occurring is that the Pennsylvania Fish Commission, owner of a certain parcel of land bounded by your clients, has entered into an agreement with the Division of Coastal Zone Management, Pennsylvania Department of Environmental Resources, to jointly fund a feasibility study entitled "Feasibility of Boating Access Development on Lake Erie, North East Township, Erie County." This one year study extending from October 1, 1982, to September 30, 1983, is being completed using the following work objectives:

Work Objectives:

1. Undertake Task II for studying the feasibility of boating access development on Lake Erie, North East Township, Erie County, as part of Fishery Implementation Segment III-C, Access Development, of the Lake Erie Fishery and Boating Program Plan.
2. Conduct field surveys of land and water areas, plot topography and investigate public utility facilities and rights of way.
3. Inventory adjacent land uses, including highway access, possible local impacts and compatibility with regional comprehensive plans and recommendations for future development.
4. Conduct engineering studies and conceptual planning, including alternate solutions and cost assessments.
5. Consolidate the project results into a final report and submit it to the Coastal Zone Management Office, Department of Environmental Resources, prior to December 31, 1983.

James R. Steadman, Esquire  
Page 2  
July 13, 1983

Considerable progress has been made on this study and portions of the final draft report have been completed.

As you are probably aware, angler and boating access to Lake Erie in the eastern portions of Erie County are very limited. The Pennsylvania Fish Commission has used this opportunity, through the use of supplemental funding, to study the feasibility of developing its property for the benefit of the fishing and boating public. We feel this is a reasonable activity, particularly because of the acute need for more and better such facilities.

We appreciate your clients' concerns, most of which are the type we hope to alleviate by conducting a thorough study. If the study should result in a proposal for further development, certainly your clients' interests would be addressed in a reasonable fashion. The Pennsylvania Fish Commission takes seriously its role both as a good neighbor and a steward of its property on behalf of those we represent. Please be assured that our intentions are not to degrade or impair, in any manner, the property of others.

When this project is completed, the report will be a public document available to your clients. Our staff is now and will in the future be available to address any questions or concerns your clients may have.

Sincerely,



Robert B. Hesser  
Project Coordinator

RBH:dk.

cc: R. W. Abele, PFC  
E. R. Miller, PFC  
R. M. Mulfinger, PFC  
D. Taylor, CZM  
A. Andrezeski, Senate  
H. Bowser, House of Rep.  
R. Hardiman, COE

JAMES R. STEADMAN  
DOUGLAS J. WRIGHT  
ATTORNEYS AT LAW  
24 MAIN STREET EAST  
P. O. BOX 87  
GIRARD, PENNSYLVANIA 16417  
TELEPHONE (814) 774-2528

July 15, 1983

REFER TO:

James R. Steadman

Robert B. Hesser  
Project Coordinator  
Pennsylvania Fish Commission  
Bureau of Fisheries and Engineering  
Robinson Lane  
Bellefonte, PA 16823

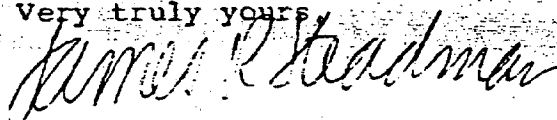
RE: North East Township  
Erie County Access Area

Dear Mr. Hesser:

Thank you for your letter of July 13, 1983.

Please advise when you intend to have public hearings regarding the development of the North East Township Access Area. My clients will desire to present testimony at such a hearing regarding their concerns and objections to the development of this area so that they may be made a matter of public record. Our position remains substantially that expressed in my letter to Mr. Richard M. Mulfinger dated March 29, 1983, a copy of which is enclosed herewith.

Very truly yours,



James R. Steadman

JRS/pg  
Encl.

CC to A. Andrezeski, Senator  
CC to Harry Bowser  
CC to Mr. and Mrs. John P. Lantzy



814-359-2754

COMMONWEALTH OF PENNSYLVANIA  
PENNSYLVANIA FISH COMMISSION  
Bureau of Fisheries and Engineering  
450 Robinson Lane  
Belleville, PA 16823-9616

August 17, 1983

Mr. James R. Steadman  
Attorney at Law  
24 Main Street East  
P. O. Box 87  
Girard, PA 16417

Dear Mr. Steadman:

I regret that I have not been able to respond more quickly to your recent letter regarding our access study at the North East Township site we previously discussed.

You are apparently under the impression that a public hearing will be held concerning the results of the North East Township access feasibility study. I felt I had made clear in my previous letter the reason for the study plus the fact that it is not a development project. Apparently I did not properly clarify this issue.

For the record, the study entitled "Feasibility of Boating Access Development on Lake Erie, North East Township, Erie County," seeks to answer what the title implies, is it feasible to further develop that site for boating access? A public hearing is not necessary as a result of this type of study and therefore none will be held. However, should the Commission decide after evaluating the study results that further development is desirable, such a project would be handled in the same manner as all state agency projects and public comment and input would be sought.

We want to reassure you that your clients' concerns are being considered, in fact your correspondence has been included in the study report.

As reported to you earlier, the study report will be a public document and will be available from the Coastal Zone Management Division following its completion later this year.

If you have further questions, please feel free to contact us.

Sincerely,

Robert B. Hesser  
Fishery Resources Biologist

RBH:dk

cc: E. Miller  
R. Weis  
D. Taylor (DER)



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL RESOURCES

P. O. Box 2357  
Harrisburg, Pennsylvania 17120

March 18, 1983



Bureau of  
Topographic and Geologic Survey

(717) 787-6029

In reply refer to  
RM-GS

Mr. Richard Mulfinger  
Pennsylvania Fish Commission  
Robinson Lane  
Bellefonte, PA 16823

Dear Mr. Mulfinger:

In the area near the end of Dewey Road in North East Township, Erie County, a veneer of glacial lake deposits comprising stratified sand, silt and clay, and some gravel, rests upon bedrock of the Northeast Shale. The veneer is of variable thickness, usually ranging from 10 to 75 feet. The Northeast Shale is thinly bedded, medium light gray siltstone, interbedded with medium gray clay shale. The Northeast Shale is Late Devonian in age (approximately 355 million years old), is of marine origin, and has a few fossils. The siltstone tends to break up as flaggy or platy pieces. The clay shale tends to break up as chippy or hackly fragments. The Northeast Shale beds are very close to horizontal, and are not folded or faulted to any measurable degree.

If you need further information on the geology of Erie County, please feel free to call upon us.

Sincerely,

THOMAS M. BERG, Chief  
Geologic Mapping Division



COMMONWEALTH OF PENNSYLVANIA  
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION  
WILLIAM PENN MEMORIAL MUSEUM AND ARCHIVES BUILDING  
BOX 1026  
HARRISBURG, PENNSYLVANIA 17120

May 11, 1983

Richard Mulfinger, P.E.  
Pennsylvania Fish Commission  
Bureau of Fisheries & Engineering  
Robinson Lane  
Bellefonte, PA 16823

Re: Pennsylvania Fish Commission's North  
East Access Area Property  
ER 83 049 0223

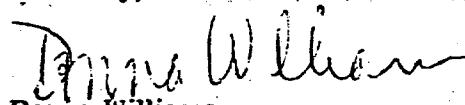
Dear Mr. Mulfinger:

The Bureau for Historic Preservation is reviewing this State funded, assisted or licensed project under the authority of the Environmental Rights Amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania Historic Preservation Act of 1978.

To our best knowledge, there are no National Register eligible or listed historic or archeological properties in the area of this proposed project and therefore, this project should have no effect upon such resources. Should the applicant become aware, from any source, that historic or archeological resources are located at or near the project site, please contact the Division of Planning and Protection.

If you need further information in this matter, please consult Bill McLaughlin or Kurt Carr of the Bureau for Historic Preservation at (717) 783-8947.

Sincerely,

  
Donna Williams  
Acting Director  
Bureau for Historic Preservation  
(717) 783-8947





814-359-2754

COMMONWEALTH OF PENNSYLVANIA  
PENNSYLVANIA FISH COMMISSION  
Bureau of Fisheries and Engineering

Robinson Lane  
Belleville, PA 16823

March 7, 1983

Buffalo District Army Corp of Engineers  
1776 Niagara Street  
Buffalo, New York 14207

Attention: Small Projects Section

Dear Sirs:

The Pennsylvania Fish Commission is in the process of drafting a C.Z.M. Feasibility Study for the North East Access Area. One of the alternatives we are investigating is the possibility of providing a safe harbor of refuge for small boats. Any assistance or information that you could provide us would be greatly appreciated.

Sincerely,

A handwritten signature in cursive script that reads "Richard M. Mulfinger".

Richard M. Mulfinger, P.E.  
Senior Project Engineer

RM/jaw





DEPARTMENT OF THE ARMY  
BUFFALO DISTRICT, CORPS OF ENGINEERS  
1776 NIAGARA STREET  
BUFFALO, NEW YORK 14207

MAR 18 1983

NCBED-HS

SUBJECT: Harbor of Refuge, North East Access Area, Pennsylvania

Richard M. Mulfinger, P.E.  
Senior Project Engineer  
Pennsylvania Fish Commission  
Bureau of Fisheries and Engineering  
Robinson Lane  
Bellefonte, PA 16823

Dear Mr. Mulfinger:

This is in response to your letter dated 7 March 1983 concerning assistance in providing a safe harbor-of-refuge for small boats in the area of the North East Access Area of Pennsylvania.

In accordance with the conditions set forth in House Document No. 446 78th Congress, 2nd Session, a total of 21 harbors-of-refuge on the Great Lakes including the Barcelona, NY harbor were authorized by the 1945 River and Harbor Act. Refuge harbors were authorized approximately 30 miles from each other in order to produce a chain that would protect boaters cruising the lakes from sudden storms. The harbors serving the north east access area of Pennsylvania are Erie Harbor, PA, and Barcelona Harbor, NY. Since these harbors are approximately 29 miles apart, I do not have authority to establish any additional harbors-of-refuge in the area of concern.

However, the same law authorized additional studies of small boat harbors and harbors-of-refuge on Lake Erie including one specifically at North East, PA. The Buffalo District completed an Interim Report for North East in 1970. This report was subsequently returned to the District by the Board of Engineers for Rivers and Harbors for restudy since the recommended project was not economically justified. The restudy was never undertaken because funds have never been appropriated for it.

Most recently, my staff met with local officials in North East on 24 April 1981 to discuss the possibility of Federal participation in constructing a small boat facility. Based on the comments received, it was obvious that local officials are opposed to the project in our 1970 Interim Report because of the high cost of construction associated with an extensive

NCBED-HS

SUBJECT: Harbor of Refuge, North East Access Area, Pennsylvania

breakwater system for several hundred permanently-based boats. As an alternative, local officials proposed a scaled-down project consisting of a harbor-of-refuge and boat launching facilities for trailer drawn boats at the mouth of 12-Mile Creek. This concept may have possibilities under the Corps "Continuing Authority" (Small Projects), program, as discussed below.

I do have authority under Section 107 of the River and Harbors Act, as amended, to investigate, design, and construct projects for improvement to general navigation. All work accomplished under this authority must be economically justified (as opposed to harbors-of-refuge, which do not require economic justification), engineeringly feasible, environmentally sound and socially acceptable. If a project were identified that would meet these criteria, then a commitment from a local sponsor would be necessary to provide the following local assurances:

a. Provide, without cost to the United States, all lands, easements, and rights-of-way necessary for the construction and subsequent maintenance of the project, and for aids to navigation, upon the request of the Chief of Engineers.

b. Hold and save the United States from damages due to construction and subsequent maintenance of the project, except for damages due to the fault or negligence of the United States or its Contractors.

c. Provide a public landing or wharf open to all on equal terms.

d. Provide, without cost to the United States, all alterations and relocations of existing improvements including utilities, sewers, and other facilities.

e. Provide a cash contribution in an amount to equal one-half of the construction cost of the general navigation features directly attributable to recreation.

f. Bear all costs in excess of the Federal first cost limitation of \$2,000,000 for construction of the project, exclusive of aids to navigation.

g. Reserve anchorage spaces and mooring facilities adequate for the accommodation of transient craft.

h. Comply with the applicable provisions of the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," Public Law 91-646, approved 2 January 1971, in acquiring lands, easements, and rights-of-way for construction and subsequent maintenance of the project, and inform affected persons of pertinent benefits, policies, and procedures in connection with said Act.

NCBED-HS

SUBJECT: Harbor of Refuge, North East Access Area, Pennsylvania

i. Comply with Section 601 of Title VI of the Civil Rights Act of 1964 (PL 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in Part 300 of Title 32, Code of Federal regulations, in connection with the maintenance and operation of the project.

j. Establish a competent and properly constituted public body empowered to prescribe and enforce regulations pertaining to navigation and to regulate the use and development of the harbor and related facilities, with the understanding that said facilities will open to all on equal terms.

These assurances are the requirements at this time and are subject to change.

If you have any questions or require any further information, please contact Mr. Ray Pilon of my Engineering Division at (716) 876-5454 extension 2146.

Sincerely,

*Joseph B. Creedon, MAJ*  
ROBERT R. HARDIMAN  
Colonel, Corps of Engineers  
District Engineer



DEPARTMENT OF THE ARMY  
 BUFFALO DISTRICT, CORPS OF ENGINEERS  
 1776 NIAGARA STREET  
 BUFFALO, NEW YORK 14207

MAY 18 1983

NCBED-DC

SUBJECT: Northeast Pennsylvania Access Area

Mr. Richard M. Mulfinger  
 Commonwealth of Pennsylvania  
 Pennsylvania Fish Commission  
 Bureau of Fisheries and Engineering  
 Robinson Lane  
 Bellefonte, PA 16823

Dear Mr. Mulfinger:

The proposed breakwater plans for the Northeast access area in Erie County, PA, which you provided Mr. Richard Gorecki of my Coastal Engineering Section have been reviewed.

The evaluation indicates that for severe design conditions (i.e. high lake level and storm waves), the waves will break lakeward of the proposed breakwaters and the regenerated wave will pass over the structures which would be submerged. Therefore, the stability of the blocks were analyzed at a lower lake level. This analysis shows that the top block on the proposed breakwater for the marina plan (Plan 1) would not be stable under its own weight for the condition analyzed. The top block on the proposed breakwaters for the boat launch plans (Plans 2 and 3) would be stable for the condition analyzed. However, under lower lake level conditions, the wave forces on the top block would be increased and the block would probably be knocked off. Therefore, it is recommended that you consider anchoring the top block for each of the plans. Most of the Corps designs consider rubblemound construction and experience has shown us that designing for a severe wave condition is sufficient to assure stability without consideration of ice loads. However, you may want to consider the impacts of ice forces on the top block of your breakwaters in order to develop an adequate anchoring system.

Storm conditions can develop on Lake Erie rather quickly. Therefore, the evaluation also considered a storm event which might occur during the boating season. This analysis was undertaken in order to determine the magnitude of the waves which can be expected in the protected area due to wave overtopping of your structures when boaters would be trying to leave the lake or moor in your marina area. The analysis shows that waves up to three feet in height could be regenerated in the lee of the structures for your marina plan and up to four-foot waves could be regenerated in the protected area of your launching plans. The actual waves could be actually higher due to wave buildup caused by the additive effects of waves as they reflect off the vertical faces of the blocks. Waves of these magnitudes would not be conducive to a berthing area for a marina plan and would make retrieval of a boat during a storm situation near impossible.

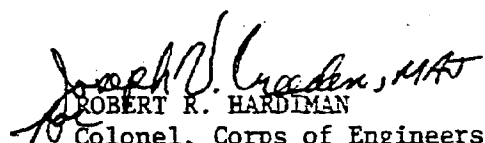
NCBED-DC

SUBJECT: Northeast Pennsylvania Access Area

In summary, it is my opinion that your launching plans would function adequately under the 2 to 3-foot wave conditions which you are considering. However, I feel that it is also necessary to consider the situation when boaters might be caught out on the lake as a storm condition develops, especially during the fall season. Also, the crest of the breakwaters for your marina plan requires additional elevation in order to provide a berthing area where the maximum acceptable wave heights are 1 to 1-1/2 feet. In addition, the magnitude of the wave in the protected area should be considered for any shoreline facilities which you may develop.

I am enclosing a copy of the evaluation. If you have any questions or comments on the matters presented herein, please feel free to contact Mr. Richard Gorecki of my Coastal Engineering Section at (716) 876-5454, extension 2230.

Sincerely,

  
ROBERT R. HARDIMAN  
Colonel, Corps of Engineers  
District Engineer

Enclosure  
as stated

BY RJG

DATE 5/83

SUBJECT Northeast Access Area  
Eric County, Pennsylvania

SHEET NO. 1 OF

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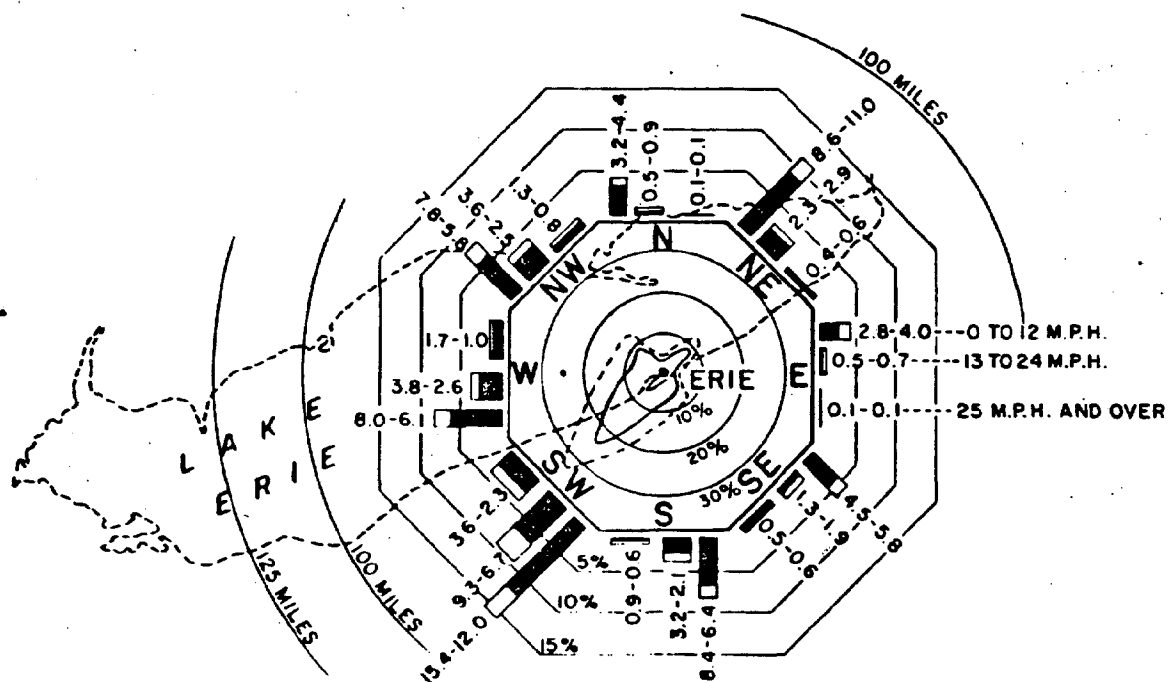
## EXPOSURE TO AND EFFECTS OF STORMS

The State access area at Northeast, PA is exposed to storm waves generated by winds from the west-southwest through west to east-northeast directions. Storms from the westerly directions have the greatest fetch and cause the most severe wave action at Northeast, PA. A wind diagram showing the relative directional frequency and intensity of winds at Erie, PA, based on U.S. Coast Guard recorded observations, is shown on Figure 1. The wind diagram is considered to reflect, reasonably well, the conditions that prevail at Northeast, PA.

## DESIGN WATER LEVELS

Design water levels for Lake Erie are based upon the International Great Lakes Datum established in 1955 at Father's Point, Quebec. Low Water Datum (LWD) is 568.6 feet above mean water level. Two water levels will be used to evaluate the State's proposed breakwater plans at the Northeast access area. The higher water level is used to determine the structural stability of the structures during all seasons of the year. The lower water level is used to evaluate the adequacy of the structures in providing a mooring/launching area that will be protected from adverse wave action due to wave overtopping of the structures during the boating season which is assumed to run from the spring through the fall months.

The design water level is a combination of the joint occurrence of the long-term average lake level with a short period fluctuation due to a storm setup. The long-term average lake levels for this evaluation were obtained from the "Standardized Frequency Curves for Design Water Level Determination on the Great Lakes," prepared by Detroit District in 1979. The short period fluctuation due to a storm setup was obtained from the "Review of Reports on Lake Erie-Lake Ontario Waterway, NY" prepared by Buffalo District in 1973.



WIND DIAGRAM FOR ERIE HARBOR, PA.

NOTES

- INDICATES DURATION FOR ICE-FREE PERIOD (MAR. TO DEC. INCL.) IN PERCENT OF TOTAL DURATION.
  - INDICATES DURATION FOR ICE PERIOD (JAN. TO FEB. INCL.) IN PERCENT OF TOTAL DURATION.
  - ~ INDICATES PERCENT OF TOTAL WIND MOVEMENT OCCURRING DURING ICE-FREE PERIOD.
  - - - INDICATES PERCENT OF TOTAL WIND MOVEMENT OCCURRING DURING COMBINED ICE AND ICE-FREE PERIODS.
- FIGURES AT ENDS OF BARS INDICATE PERCENT OF TOTAL WIND DURATION FOR ICE FREE PERIOD AND COMBINED ICE-FREE AND ICE PERIODS, RESPECTIVELY.

WIND DATA BASED ON RECORDS OF THE U. S. COAST GUARD AT ERIE HARBOR, PA. FOR PERIOD 1 JAN. 1928 TO 31 DEC. 1941 AND 1 JAN. 1945 TO 31 DEC. 1971.



A 20-year recurrence water level will be determined in order to compute the maximum incident wave height at the location of the proposed breakwaters for evaluation of structural stability. The 20-year recurrence water level was determined by combination of a 20-year annual mean lake level with a 12-month short period fluctuation. The frequency curve for annual mean levels of Lake Erie is shown on Figure 2 and indicates that an annual mean level of approximately 573.0 occurs once in 20 years. Northeast, PA lies about 65 miles southwest of Buffalo, NY and about 110 miles northeast of Cleveland, Ohio; therefore a reasonable estimate of the peak rise at Northeast, PA was made by interpolating between the peak rises which can occur at Cleveland (Figure 3) and Buffalo (Figure 4). Interpolating between Figures 3 and 4 indicates that a fluctuation of about 3.5 feet can be expected at Northeast, PA each year. Combining the annual mean level of 573.0 which has a 20-year recurrence with a 3.5-foot short-term fluctuation that has a 1-year recurrence, yields a 20-year recurrence design lake level of 576.5 or +7.9 feet above low water datum.

A 20-year recurrence water level during the boating season (spring through fall) was determined to evaluate the crest elevation of the proposed breakwaters in preventing adverse wave activity from occurring in the mooring/launching area during the boating season. This evaluation considered the 20-year recurrence water level that occurs during the fall season as the critical design condition. The 20-year recurrence water level was determined by combination of a 20-year fourth quarter mean lake level with a 12-month short period fluctuation. The frequency curve for fourth quarter mean levels of Lake Erie is shown on Figure 5 and indicates that a mean level of approximately 572.0 occurs once in 20-years. As discussed in the preceding

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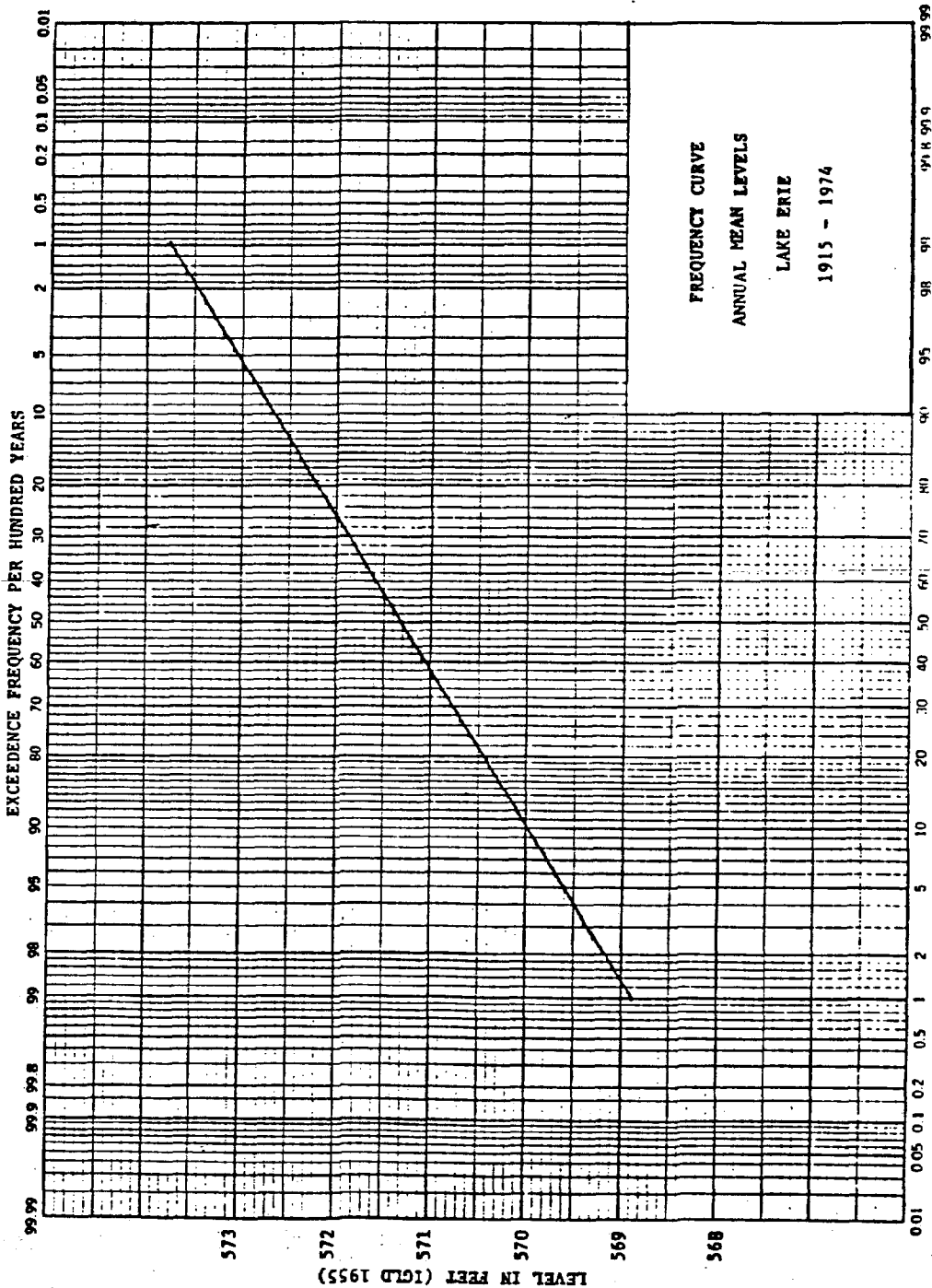
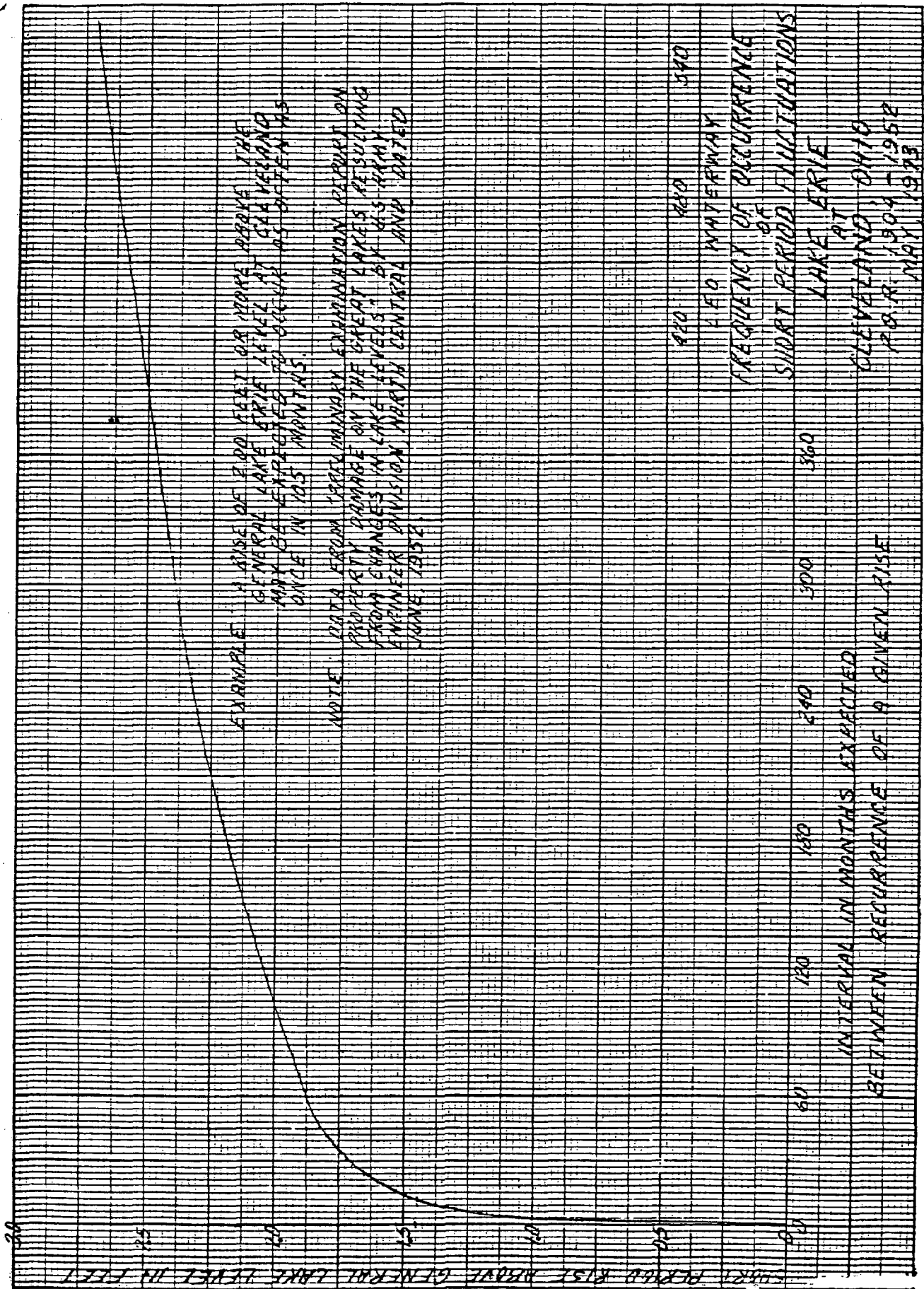


Figure 2



420 400 380 360 340  
 140 UNDERWAY  
 FREQUENCY OF OCCURRENCE  
 SHORT PERIOD FLUCTUATIONS  
 LAKE ERIE  
 CLEVELAND, OHIO  
 P.O.R. 1904-1952  
 MAY 1953

Figure 3

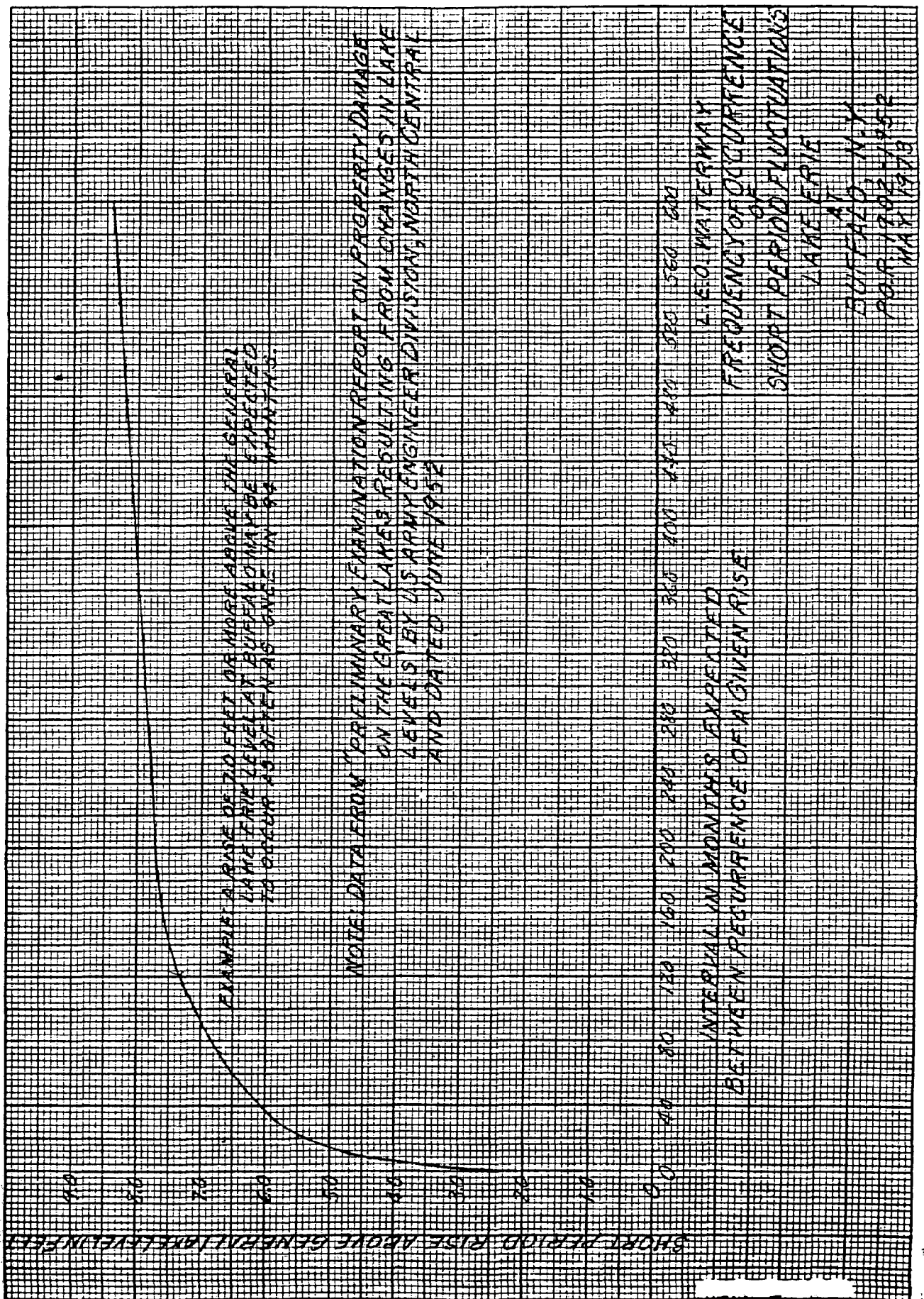


Figure 4

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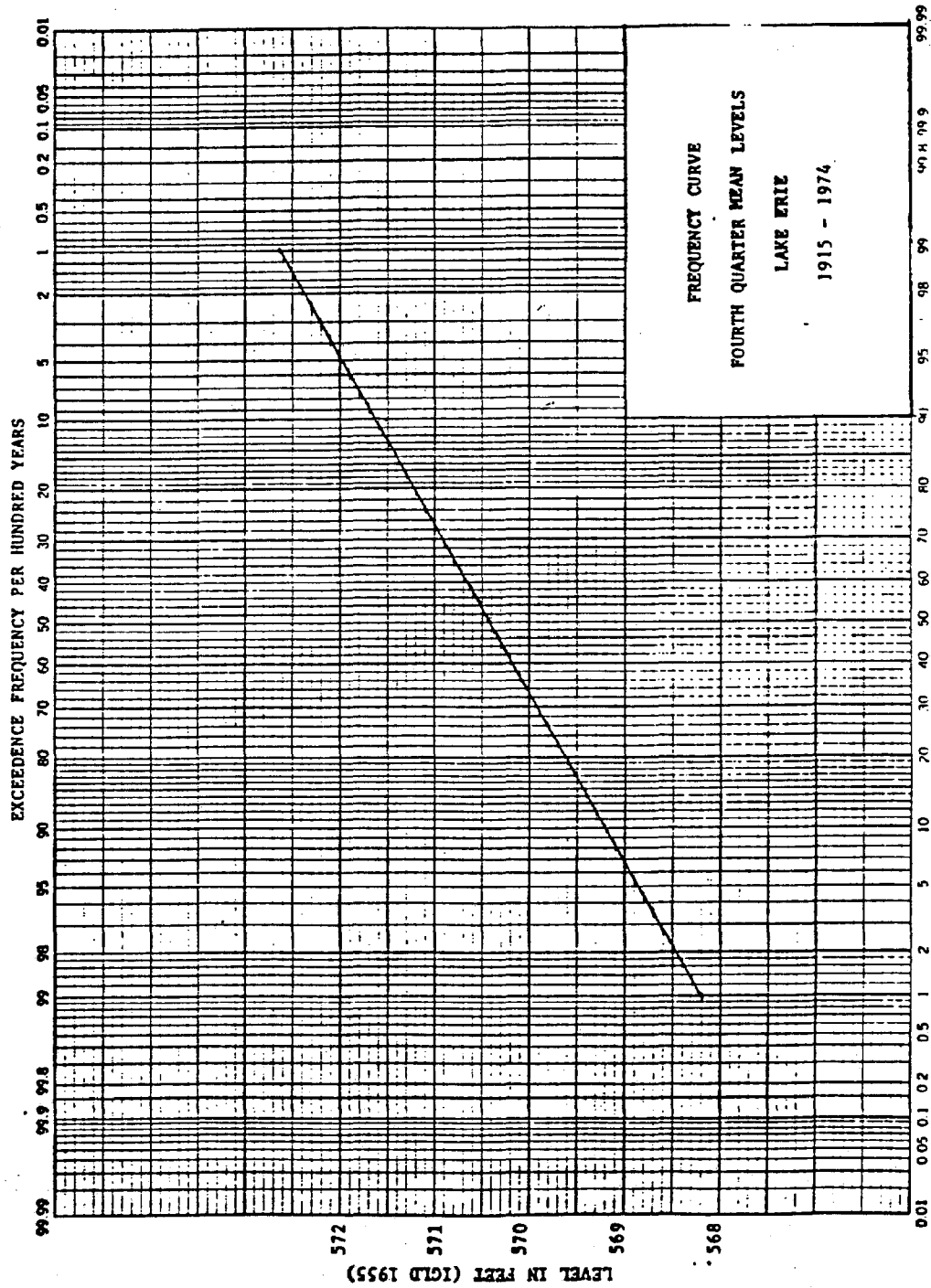


Figure 5

paragraph, a fluctuation of about 3.5 feet can be expected at Northeast, PA each year. Combining the fourth quarter mean level of 572.0 which has a 20-year recurrence with a 3.5-foot short term fluctuation that has a 1-year recurrence, yields a 20-year recurrence fourth quarter design lake level of 575.5 or +6.9 feet above low water datum.

### DEEP WATER WAVE CHARACTERISTICS

a) General. The Northeast, PA access area can be subjected to waves spanning approximately 180 degrees of Lake Erie from the west-southwest through west to east-northeast directions. This range extends from approximately 240 degrees (west-southwest) to 60 degrees (east-northeast). Three angle class can be defined as viewed by an observer standing on shore and are depicted on Figure 6 and distinguished below:

(1) Angle Class 1 - Mean wave approach angle greater than 30 degrees to the right of a normal to shore (0 degrees through 60 degrees).

(2) Angle Class 2 - Mean wave approach angle within 30 degrees to either side of a normal to shore (300 degrees through 360 degrees).

(3) Angle Class 3 - Mean wave approach angle greater than 30 degrees to the left of a normal to shore (240 degrees through 300 degrees).

b) Significant Deep Water Wave Heights ( $H_o$ ). The significant deep water wave heights which can be expected at Northeast, PA were determined by Waterways Experiment Station and published in Technical Report H-76-1, entitled "Design Wave Information for the Great Lakes - Report 1" dated January 1976. Table 1 presents the significant deep water wave heights east of Northeast, PA for three angle classes as distinguished above, for each season of the year, and for various recurrence intervals.

c) Wave Period ( $T_o$ ). Table 2 presents the wave periods associated with each significant deep water wave height east of Northeast, PA as a function of angle class and wave height as presented in Technical Report H-76-1.

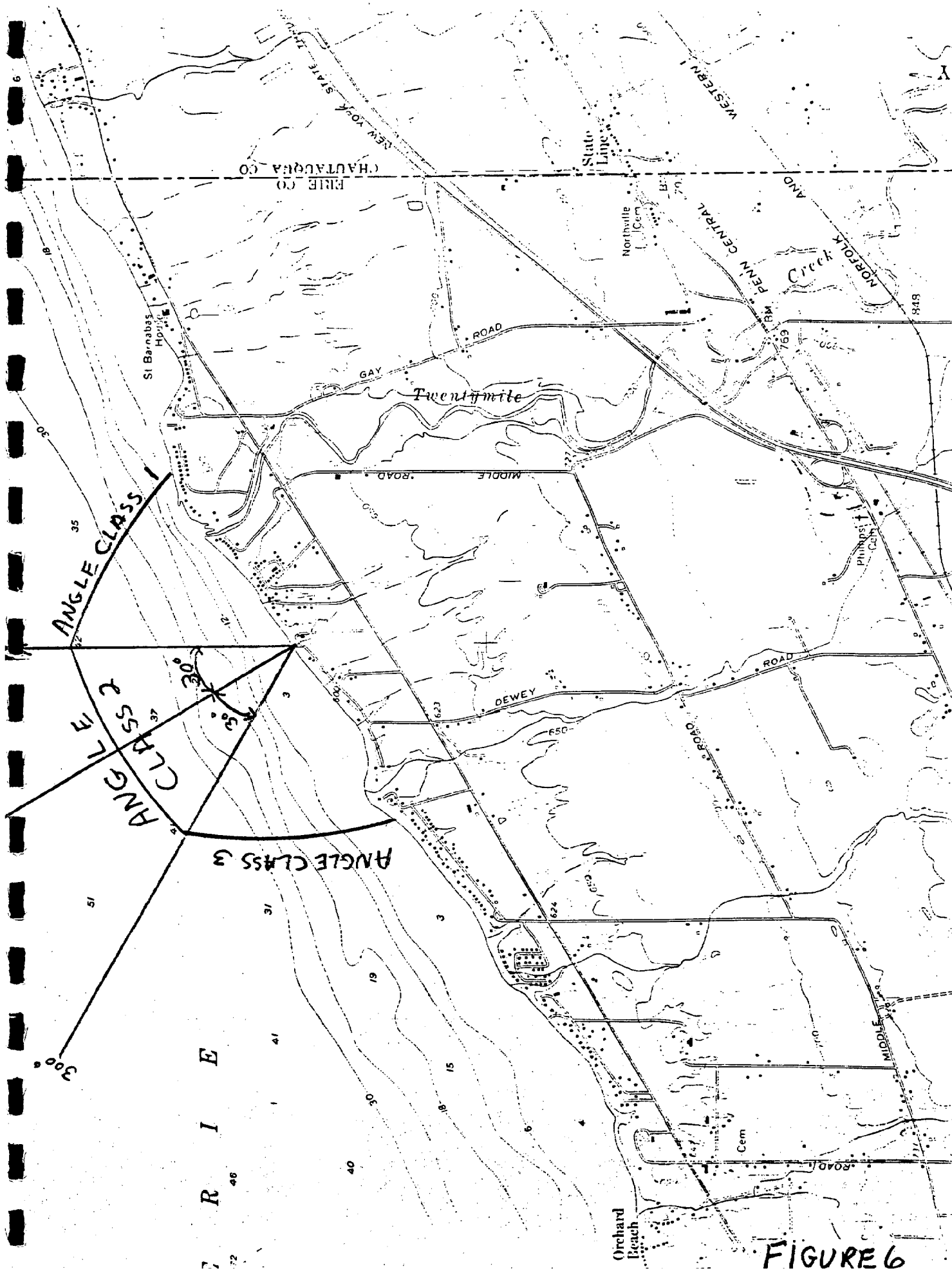


Table 1

TABLE OF EXTREMES ESTIMATES  
 GRID LOCATION 5,20 LAT=42.41 LON=79.75  
 SHORELINE GRID POINT 20

EAST OF NORTH  
 EAST PA

WINTER  
ANGLE CLASSES

	1	2	3	ALL
5	4.6( 0.7)	8.5( 0.4)	12.5( 0.3)	12.3( 0.8)
10	6.6( 1.0)	9.5( 0.6)	13.1( 0.4)	13.2( 1.0)
20	8.2( 1.2)	10.5( 0.7)	13.8( 0.5)	14.1( 1.2)
50	10.8( 1.5)	11.8( 0.9)	14.8( 0.6)	15.3( 1.5)
100	12.5( 1.7)	12.8( 1.0)	15.7( 0.7)	16.3( 1.8)

SPRING  
ANGLE CLASSES

	1	2	3	ALL
5	3.6( 0.5)	2.3( 0.6)	7.2( 0.5)	7.6( 0.6)
10	3.9( 0.7)	3.9( 0.8)	8.5( 0.7)	8.9( 0.9)
20	4.6( 0.8)	5.2( 1.0)	9.8( 0.9)	10.2( 1.1)
50	6.2( 1.0)	7.5( 1.3)	11.5( 1.1)	11.9( 1.3)
100	7.5( 1.2)	8.9( 1.5)	12.8( 1.2)	13.2( 1.5)

SUMMER  
ANGLE CLASSES

	1	2	3	ALL
5	3.6( 1.0)	4.9( 0.5)	6.6( 0.4)	6.5( 1.0)
10	3.9( 1.3)	5.2( 0.6)	6.9( 0.5)	7.0( 1.3)
20	4.6( 1.6)	5.9( 0.8)	7.2( 0.6)	7.4( 1.7)
50	5.9( 2.0)	6.6( 1.0)	7.9( 0.8)	8.1( 2.1)
100	6.9( 2.3)	6.9( 1.1)	8.2( 0.9)	8.6( 2.4)

FALL  
ANGLE CLASSES

	1	2	3	ALL
5	6.9( 0.2)	8.5( 0.5)	11.8( 0.2)	12.1( 0.5)
10	7.5( 0.3)	9.8( 0.6)	12.5( 0.3)	12.7( 0.6)
20	8.2( 0.3)	10.8( 0.8)	13.1( 0.4)	13.4( 0.8)
50	8.9( 0.4)	12.1( 0.9)	13.8( 0.5)	14.2( 1.0)
100	9.2( 0.5)	13.4( 1.1)	14.4( 0.6)	14.9( 1.1)



Table 2

GRID LOCATION 5,20 LAT=42.41 LON=79.75

EAST OF NORTH

GRID POINT NUMBER 20

EAST PA

## SIGNIFICANT PERIOD BY ANGLE CLASS AND WAVE HEIGHT

WAVE HEIGHT (FT)

ANGLE CLASS

	1	2	3
1	2.3	2.2	2.6
2	3.6	3.5	3.9
3	4.5	4.4	4.9
4	5.2	5.1	5.7
5	5.8	5.7	6.3
6	6.1	6.0	6.7
7	6.4	6.3	7.1
8	6.7	6.6	7.6
9	7.0	6.9	8.0
10	7.4	7.3	8.4
11	7.7	7.6	8.8
12	8.0	7.9	9.2
13	8.3	8.2	9.7
14	8.6	8.5	10.1
15	8.9	8.8	10.5
16	9.2	9.1	10.9
17	9.5	9.4	11.3
18	9.8	9.7	11.8
19	10.1	10.0	12.2
20	10.4	10.3	12.6
21	10.8	10.7	13.0
22	11.1	11.0	13.4
23	11.4	11.3	13.9
24	11.7	11.6	14.3
25	12.0	11.9	14.7

## DESIGN STRUCTURE DEPTH ( $d_s$ )

The proposed breakwaters for the Northeast access area were analyzed at a single location in this design evaluation. The design structure depth ( $d_s$ ) of the structure toe for the typical section was determined from the sketches provided by Mr. Richard Mulfinger - Pennsylvania Fish Commission. (see Plans 1, 2 & 3 attached) The design structure toe depth was determined at the depth contour at which the end of the proposed breakwater is positioned. Based on the layout and typical section provided by the Pennsylvania Fish Commission, elevation 565.0 (3.6 ft below LWD) IGLD (566.5 USCGS) was selected for evaluation of the structure. The depth contour at the structure toe plus the design water level (DWL) minus the low water datum (LWD) elevation equals the design depth of water at the structure toe. The design structure depth values used in this evaluation are as follows:

$$d_s = \text{depth contour} + \text{DWL} - \text{LWD}$$

$$\text{where LWD} = 568.6$$

$$d_s = 3.6 + 576.5 - 568.6 = 11.5 \text{ feet - for stability evaluation}$$

$$d_s = 3.6 + 575.5 - 568.6 = 10.5 \text{ feet - for crest height evaluation}$$

## DEEP WATER DESIGN WAVES ( $H_o$ )

A 10-year recurrence deep water wave will be used as the design condition for evaluating the stability and crest elevation of the proposed breakwaters. Table 3 summarizes the 10-year recurrence deep water wave heights from Table 1 and associated wave periods from Table 2 which were used to evaluate the proposed structures. Table 3 also presents the season during which the deep water wave occurs, the angle class from which the wave propagates, and the design water level.

## WAVE REFRACTION ANALYSIS

Refraction Coefficients ( $K_r$ ) were calculated using the

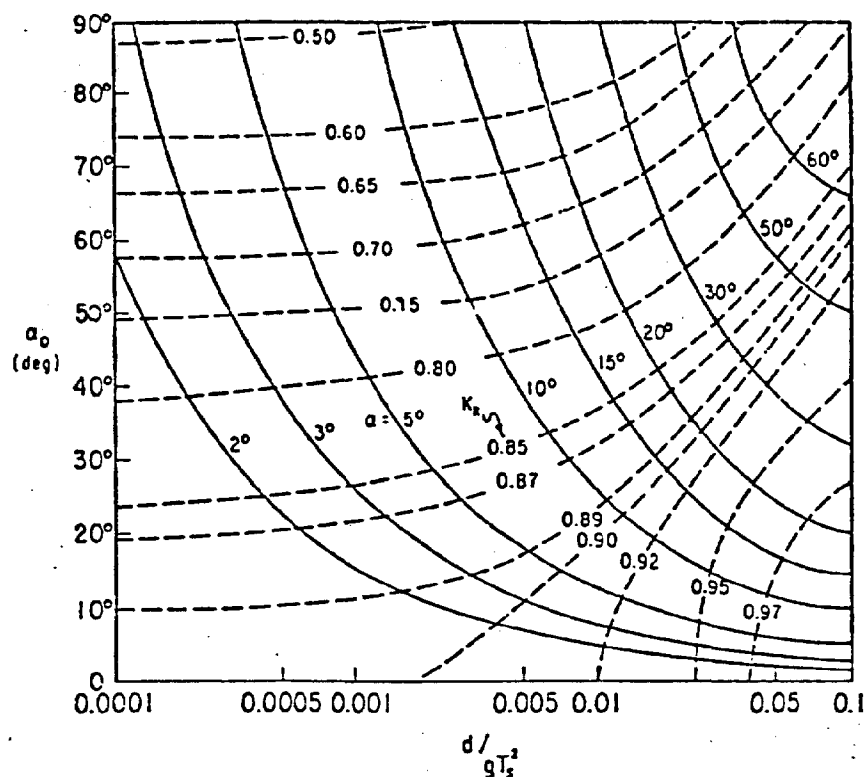
design curves in Appendix A of Technical Paper No. 80-3 entitled "Estimating Nearshore Conditions for Irregular Waves". The design curves for  $S^* = 4$  which relates to wind waves (Figure 7) were used to compute the refraction coefficients for the dominant wave direction angles ( $\alpha_0$ ). The refraction coefficient ( $K_r$ ) is determined by finding the intersection of the deep water wave angles ( $\alpha_0$ ) on the abscissa with the value of  $d/gT_s^2$  on the ordinate where  $d$  is the nearshore water depth of interest,  $g$  is the acceleration due to gravity, and  $T_s$  is the wave period.  $K_r$  is estimated by interpolation between curves of constant  $K_r$ . Table 4 is a summary of the steps followed to determine the refraction coefficients that were used in determination of the incident waves.

#### SHOALING ANALYSIS

The effects of shoaling on reducing wave heights were analyzed to determine the design incident waves at the proposed breakwaters. The design curves from Appendix B of Technical Paper No. 80-3 were used to analyze the waves as they move from deep water into shallower water and to determine the incident wave heights. The procedure consists essentially of using the appropriate "GODA" curve based on design depth ( $d_s$ ), unrefracted deep water wave height ( $H'_0$ ), deep water wave steepness ( $H'_0/L_0$ ), and lake bottom slope ( $m$ ), from which the incident wave height can be determined. Table 5 is a summary of the steps used in conjunction with the "GODA" curves to deduce the incident waves.

#### DESIGN INCIDENT WAVES

The significant wave height ( $H_{sig}$ ) resulting from a fall water level and fall wave will be used to evaluate the transmitted wave heights which can be expected in the protected area during the boating season and the maximum wave height ( $H_{max}$ ) resulting



Wave refraction for  $S^* = 4$ .

- $d$  = nearshore water depth of interest
- $g$  = acceleration of gravity
- $T_s$  = Wave Period
- $\alpha_s$  = dominant deep water wave direction angle
- $\alpha$  = nearshore wave direction angle
- $K_R$  = Wave Refraction Coefficient

Figure 7 - Design Curves for Determination of Refraction Coefficients for Wind Generated Waves

BY RJGDATE 5/83SUBJECT Northeast Access Area

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Table 3 - Summary of Design Deep Water Waves ( $H_0$ )

Deep Water Wave Height ( $H_0$ ) (Feet)	Wave Period ( $T_s$ ) (Seconds)	Season	Angle Class	Design Water Level
13.1	9.7	Winter	3	EL 576.5 (+7.9 Feet)
12.5	9.5	Fall	3	EL 575.5 (+6.9 Feet)
13.1	9.7	Winter	3	EL 574.0 (+5.4 Feet)

Table 4 - Determination of Refraction Coefficients ( $K_r$ )

Deep Water Wave Height ( $H_0$ ) (Feet)	$\alpha_0$	$d_s$ (feet)	$g$ (feet/sec <sup>2</sup> )	$T_s$ (seconds)	$d/gT_s^2$	$K_r$
13.1	30°	11.5	32.2	9.7	0.004	0.84
12.5	30°	10.5	32.2	9.5	0.004	0.84
13.1	30°	9.0	32.2	9.7	0.003	0.83

from a winter water level and winter wave will be used to evaluate the stability of the proposed concrete blocks. The analysis presented in Table 5 indicates that a 7.5-foot incident wave can be expected to occur during the fall season while a 9.8-foot incident wave can be expected to occur during the winter season. An analysis is made in Table 6 to determine the range of depths over which breaking may start to occur for the maximum incident wave. If the design structure depth ( $d_s$ ) at the toe of the proposed breakwater falls within or is less than the range as determined by Figures 7-2 and 7-3 of the Shore Protection Manual, the  $H_{max}$  wave will be considered to be a breaking wave.

### STABILITY EVALUATION

Under the design condition selected (20-year water level and 10-year deep water wave), the proposed breakwaters would be submerged and the  $H_{max}$  wave will have broken before striking the structure. Therefore, the severe storm condition would have an insignificant effect on the stability of the structures in each of the State's improvement plans. In order to evaluate the dynamic pressures that might be expected on the top block of the proposed typical breakwater sections when a wave hits the structure, a lower water level and resulting incident wave condition was analyzed. The long-term average lake level of 570.5 (+1.9 feet) for Lake Erie was combined with the 1-year short term fluctuation of 3.5 feet to yield a water level of 574.0 for evaluation. The 10-year deep water wave (13.1 feet) which occurs during the winter season was selected for this analysis. The steps utilized to determine the resulting 7.7-foot incident wave are presented in Tables 3 through 5.

The Minikin Method presented in Section 7.34 of the Shore Protection Manual was used to determine wave forces acting on the top block. The analysis indicates that the top block for the marina plan (Plan 1) would not be stable under its own weight and

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Eric County, Pennsylvania

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Table 5- Determination of Incident Wave Heights

$H_o$ (feet)	$K_r$	$H'_o = H_o K_r$ (feet)	$d_s$ (feet)	$T_s$ (Seconds)	$L_o = 5.12 T_s^2$ (feet)	$H'_o / L_o$	$d_s / H'_o$	$m$	$H_{sig} / H'_o$	$H_{max} / H'_o$	$H_{sig}$ (ft)	$H_{max}$ (ft)
13.1	0.84	11.0	11.5	9.7	481.7	0.023	1.05	0.01	—	0.89	—	9.8
12.5	0.84	10.5	10.5	9.5	462.1	0.023	1.00	0.01	0.71	—	7.5	—
13.1	0.83	10.9	9.0	9.7	481.7	0.023	0.83	0.01	—	0.71	—	7.7

Table 6- Determination of Breaking Wave Condition

$H'_o$ (ft)	$T_s$ (sec)	$H_{max}$ (ft)	$m$	$g$ (ft/sec <sup>2</sup> )	$H'_o / g T_s^2$	$H_b / H'_o$	$H_b$ (ft)	$H_b / g T_s^2$	$(d_b / H_b)_{max}$	$(d_b / H_b)_{min}$	$(d_b)_{max}$ (ft)	$(d_b)_{min}$ (ft)	$d_s$ (ft)	Wave Type
11.0	9.7	9.8	0.01	32.2	0.0036	1.15	12.7	0.0042	1.52	1.2	19.3	15.2	11.5	Breaking
10.9	9.7	7.7	0.01	32.2	0.0036	1.15	12.7	0.0042	1.52	1.2	19.3	15.2	9.0	Breaking

waves would slide it off unless it were anchored. The top block for the launching plans (Plans 2 and 3) would be stable for the condition analyzed. However, at lower water level conditions, the forces on the top block would be increased therefore, it is recommended that the top blocks be anchored for these plans also. The calculations for the stability analysis are attached to this evaluation.

### CREST HEIGHT EVALUATION

Overtopping of structures can be tolerated only if it does not cause damaging waves behind the structures. Whether overtopping will occur depends on the height of the crest of the structure relative to wave runup which depends on wave characteristics, structure slope, porosity, and roughness of the cover layer. Special Report No 2 dated December 1974 and entitled "Small Craft Harbors: Design, Construction, and Operation," states that the maximum acceptable wave heights in berthing areas are about 1 to 1½ feet. Wave transmission in the lee of the State's proposed breakwaters will occur due to wave overtopping when wave runup exceeds the crest elevation of the structure. A crest elevation of the breakwaters was established by the Pennsylvania Fish Commission for each breakwater plan and range from about 5.5 to 8.5 feet above low water datum. An estimation of the wave heights transmitted in the lee of the breakwaters for each plan was analyzed using the method presented in Technical Report 80-1 entitled "Two-Dimensional Tests of Wave Transmission and Reflection Characteristics of Laboratory Breakwaters" dated June 1980. The results from the analyses indicate that waves up to 3 feet could be generated in the lee of the breakwaters for the marina plan and 3.5 to 4 feet waves could be generated in the protected area for the launching plans. It is concluded that waves of these magnitudes would not be conducive to a berthing area for a marina plan and would make retrieval of a boat during a storm situation near impossible. The calculations for the analysis are attached to this evaluation.



## STABILITY ANALYSIS

### PLAN 1

$$H_b = 12.7 \text{ ft}$$

$$g = 32.2 \text{ ft/sec}^2$$

$$d_b = 15.2 \text{ ft (from Table 6)}$$

$$w = 62.4 \text{ lb/ft}^3$$

$P_m$  = dynamic pressure

$$P_m = \frac{w d_b}{2} = \frac{(62.4)(15.2)}{2} = 474.2 \text{ lb/ft}^2$$

$$h_c = \text{height of block} = 2.0 \text{ ft}$$

$R_m$  = dynamic component of the wave force

$$R_m = P_m h_c = (474.2)(2.0 \text{ ft}) = 948.4 \text{ lbs/ft}$$

$P_s$  = hydrostatic pressure

$$P_s = w(h_c) = (62.4)(2.0) = 124.8 \text{ lb/ft}^2$$

$R_s$  = hydrostatic force component

$$R_s = \frac{w(h_c)^2}{2} = \frac{(62.4)(2)^2}{2} = 124.8 \text{ lb/ft}$$

$$R_t = \text{Total force} = R_m + R_s = 948.4 + 124.8 = 1073 \text{ lb/ft}$$

$$\text{Total force on block} = R_t \times \text{width of block} = 1073 \times 5.83 = 6255 \text{ lbs}$$

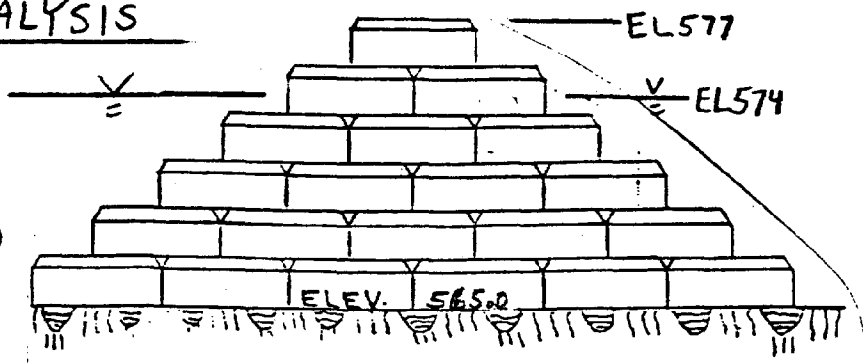
$u$  = coefficient of friction

$$F = \text{Total force on block} = 6255 \text{ lbs}$$

$$N = \text{weight of block} \approx 3.5 \text{ Tons} = 7000 \text{ lbs}$$

$$u = \frac{F}{N} = \frac{6255}{7000} = 0.89$$

The coefficient of friction for concrete sliding on concrete is in the range of 0.7 to 0.8. Therefore, a coefficient of 0.89 is a bit high. It can be concluded that waves will probably knock the top block off unless it is pinned.



BY RJG

DATE 5/83

SUBJECT Northeast Access Area

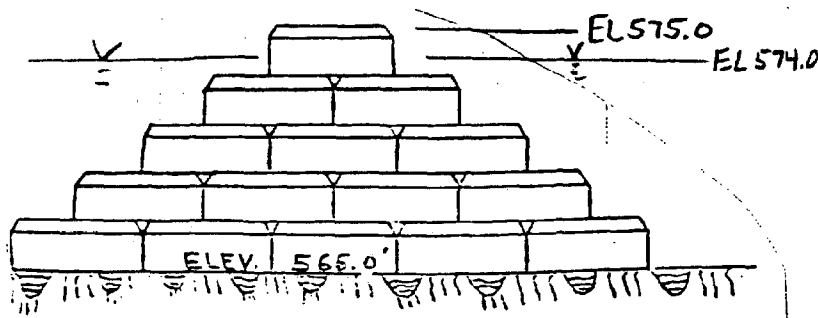
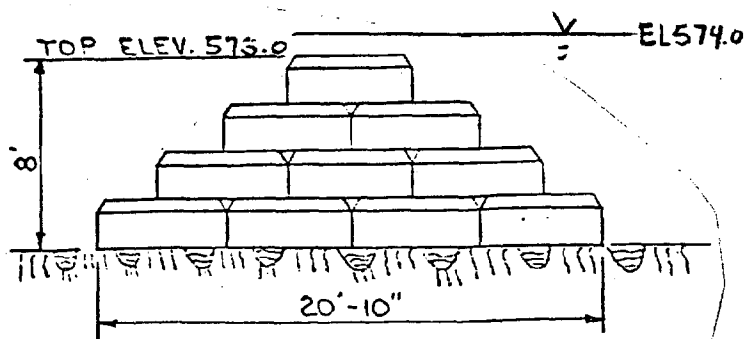
SHEET NO. OF

CHKD. BY

DATE

Erle County, Pennsylvania

JOB NO.

STABILITY ANALYSIS (continued)PLAN 2PLAN 3

For Plans 2 and 3, the lower crest elevations of the proposed structures will yield forces on the top block that are less than those determined for Plan 1. Therefore, the top block should be stable for the wave and water level condition selected. However, for lower water level conditions, the dynamic component of the wave force and the hydrostatic force component will increase therefore, the top block should also be anchored for Plans 2 and 3.

BY Rowen

DATE 5/5/83

SUBJECT Northeast Access Area

SHEET NO. OF

CHKD. BY

DATE

Erie County, Pennsylvania

JOB NO.

WAVE TRANSMISSION ANALYSIS

USING THE METHOD OUTLINED IN TR-80-1  
 "TWO DIMENSIONAL TESTS OF WAVE TRANSMISSION  
 AND REFLECTION CHARACTERISTICS OF  
 LABORATORY BREAKWATERS" BY WILLIAM N. SEELIG,  
 JUNE 1980.

PARAMETERS CONSTANT FOR ALL PLANS:

$$H_0 = 12.5'$$

$$\text{WATER LEVEL} = 575.5$$

$$H_L = 7.5'$$

$$d_s = 10.5'$$

$$T_s = 9.5 \text{ sec}$$

$$L_0 = 462.1'$$

$$\frac{d}{L_0} = \frac{10.5}{462.1} = .02272$$

FROM SPM TABLE C-1

$$\begin{array}{cc} d/L_0 & d/L \\ .02200 & .06057 \\ .02272 & \\ .02300 & .06200 \end{array}$$

$$d/L = .06157 \rightarrow L = 171$$

PLAN 1

$$\text{ELEVATION OF STRUCTURE CREST} = 577.5 \quad h = 12.5'$$

$$R = H_L \left( \frac{0.123 L}{H} \right)^{C_2 \sqrt{H/d} + C_3}$$

FROM TABLE 2 :  $C_1 = 0.958$ ,  $C_2 = 0.228$ ,  $C_3 = 0.0578$   
 FOR A VERTICAL SMOOTH IMPERMEABLE SLOPE

$$R = 7.5 (0.958) \left( \frac{0.123 (171)}{7.5} \right)^{(.228 (7.5/10.5)^{1/2} + 0.0578)}$$

$$R = 9.3'$$

$$K_{T0} = C \left( 1 - \frac{F}{R} \right) \quad \text{where } C = 0.51 - \frac{0.11B}{h}$$

$$B = \text{crest width} = 4.6'$$

$$K_{T0} = .47 \left( 1 - \frac{2}{9.3} \right) = .318$$

$$C = 0.51 - \frac{0.11(4.6)}{12.5} = .47$$

$$K_{T0} = .37$$

$$F = \text{FREEBOARD} = 577.5 - 575.5 = 2'$$

$$H_T = K_{T0} H_L = .37 (7.5) = 2.8'$$

## PLAN 2

ELEVATION OF STRUCTURE CREST = 575.5 ;  $h = 10.5'$

$$R = 9.3'$$

$$F = \text{FREEBOARD} = 575.5 - 575.5 = 0$$

$$C = 0.51 - \frac{0.11B}{h} = 0.51 - \frac{0.11(4.6)}{10.5} = .46$$

$$K_{T0} = C \left(1 - \frac{F}{R}\right) = .46 \left(1 - \frac{0}{9.3}\right) = .46$$

$$H_T = K_{T0} H_i = .46(7.5) = 3.5'$$

## PLAN 3

ELEVATION OF STRUCTURE CREST = 573.5 ;  $h = 8.5'$

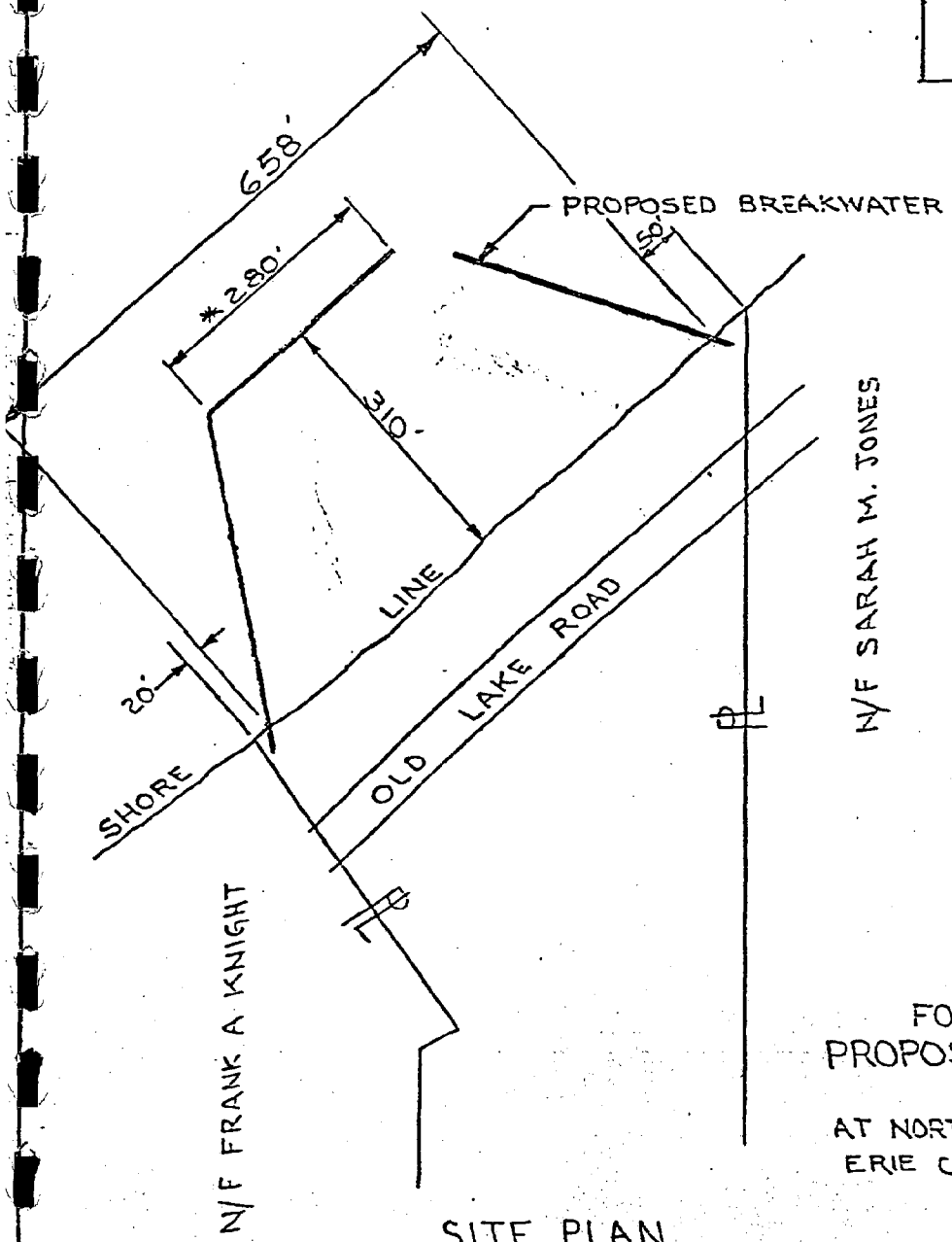
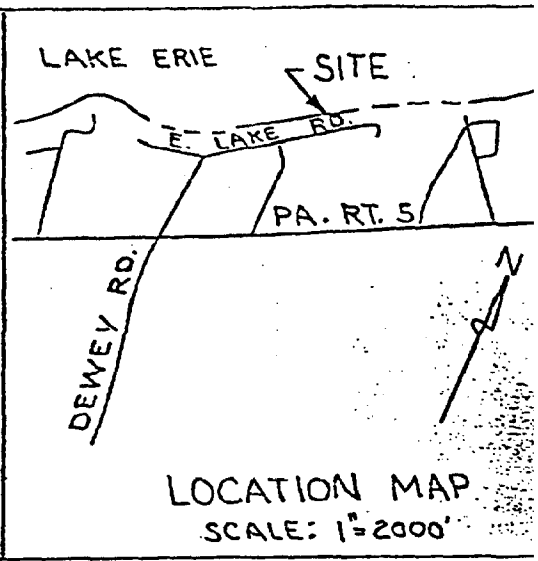
$$R = 9.3'$$

$$F = \text{FREEBOARD} = 573.5 - 575.5 = -2$$

$$C = 0.51 - \frac{0.11(4.6)}{8.5} = .45$$

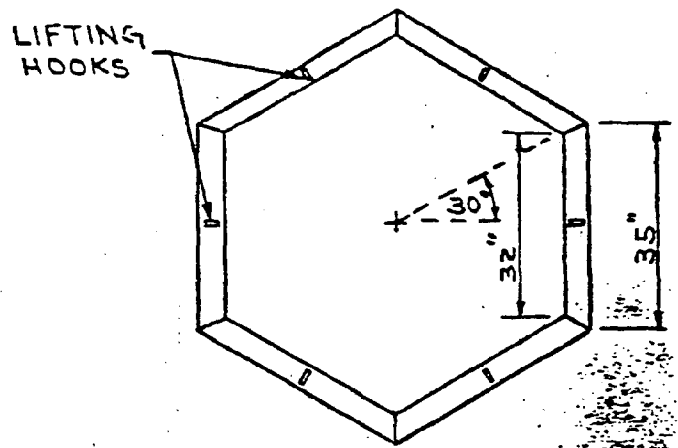
$$K_{T0} = C \left(1 - \frac{F}{R}\right) = .45 \left(1 - \frac{-2}{9.3}\right) = .55$$

$$H_T = K_{T0} H_i = .55(7.5) = 4.1'$$

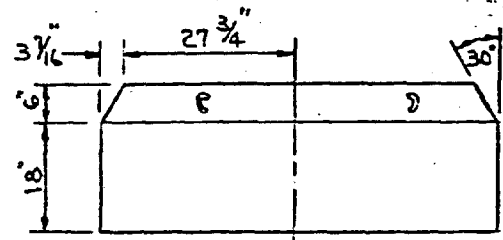


FOR A MARINA  
PROPOSED BREAKWATER  
IN LAKE ERIE  
AT NORTH EAST ACCESS AREA  
ERIE COUNTY, PENNSYLVANIA

PLAN 1



PLAN

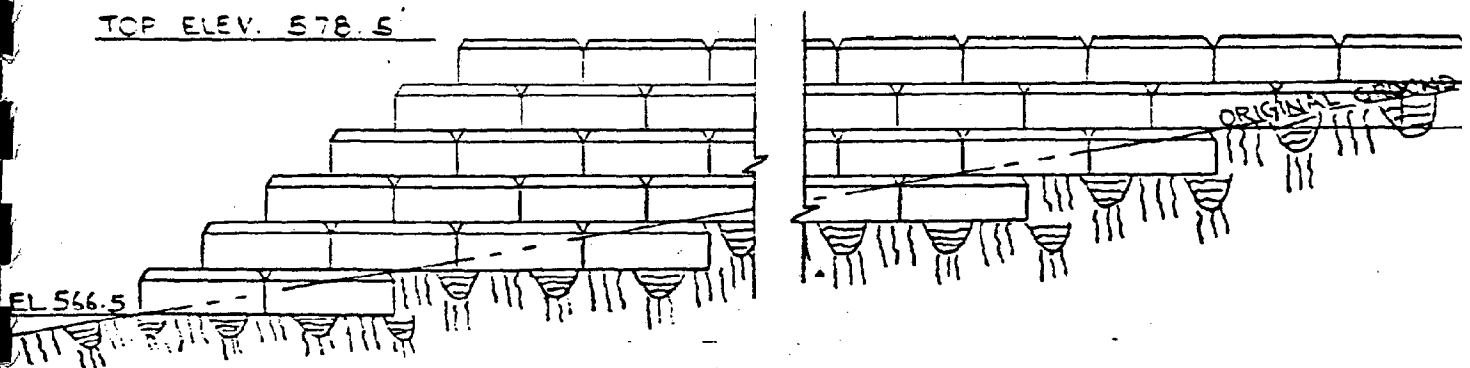


ELEVATION

SHORE PROTECTION BLOCK  
SCALE:  $\frac{3}{8}" = 1'-0"$

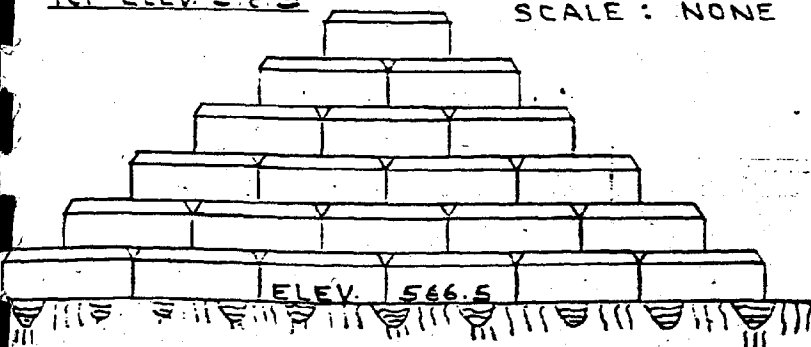
Note: All elevations indicated are at  
USCBGS

TCP ELEV. 578.5'



ELEVATION OF BREAKWATER  
SCALE: NONE

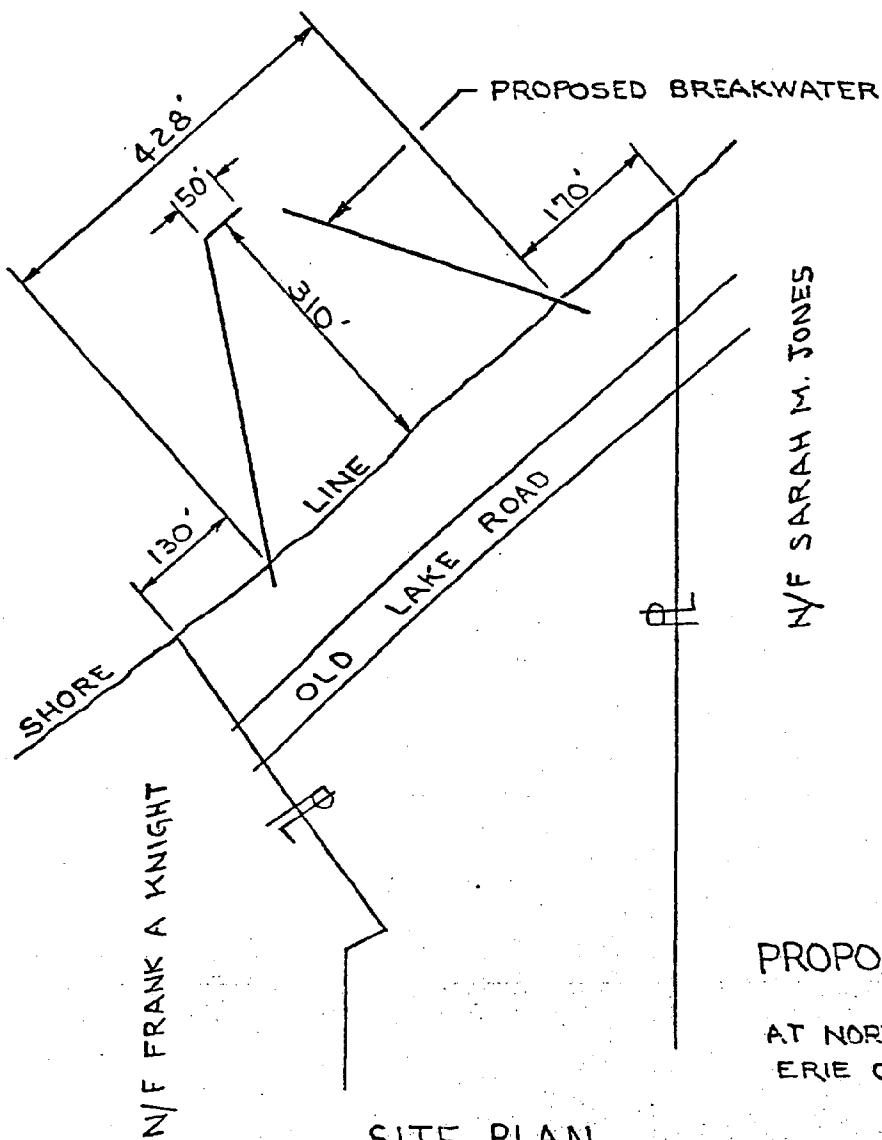
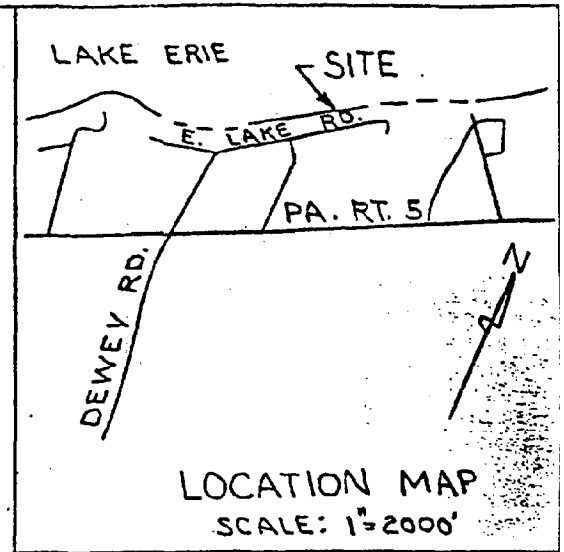
TCP ELEV. 578.5'



TYPICAL CROSS SECTION  
SCALE:  $\frac{1}{8}" = 1'-0"$

PROPOSED BREAKWATER  
IN LAKE ERIE  
AT NORTH EAST ACCESS AREA  
ERIE COUNTY, PENNSYLVANIA

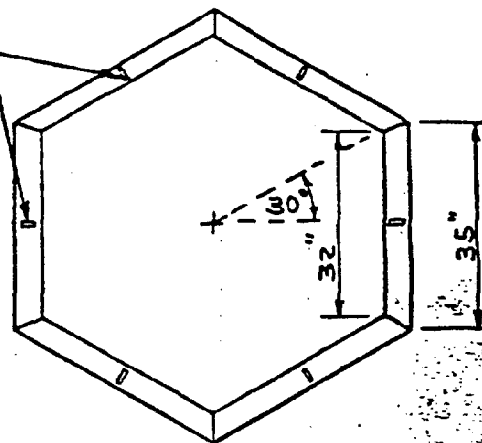
PLAN 1



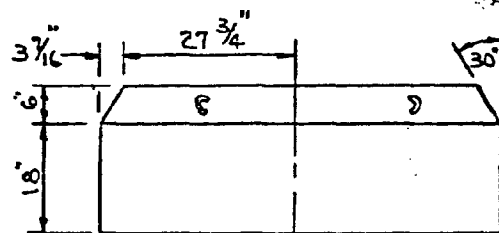
PROPOSED BREAKWATER  
IN LAKE ERIE  
AT NORTH EAST ACCESS AREA  
ERIE COUNTY, PENNSYLVANIA

PLAN 2

LIFTING  
HOOKS



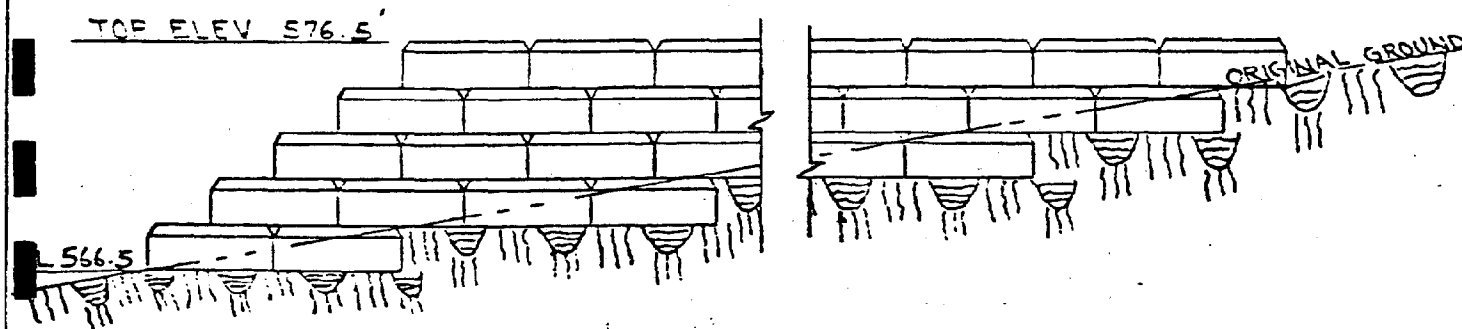
PLAN



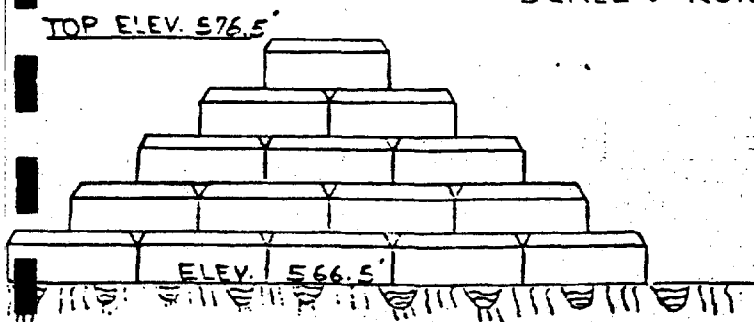
ELEVATION

SHORE PROTECTION BLOCK  
SCALE:  $\frac{3}{8}'' = 1'-0''$

Note: All elevations indicated are at  
USC & GS



ELEVATION OF BREAKWATER  
SCALE: NONE

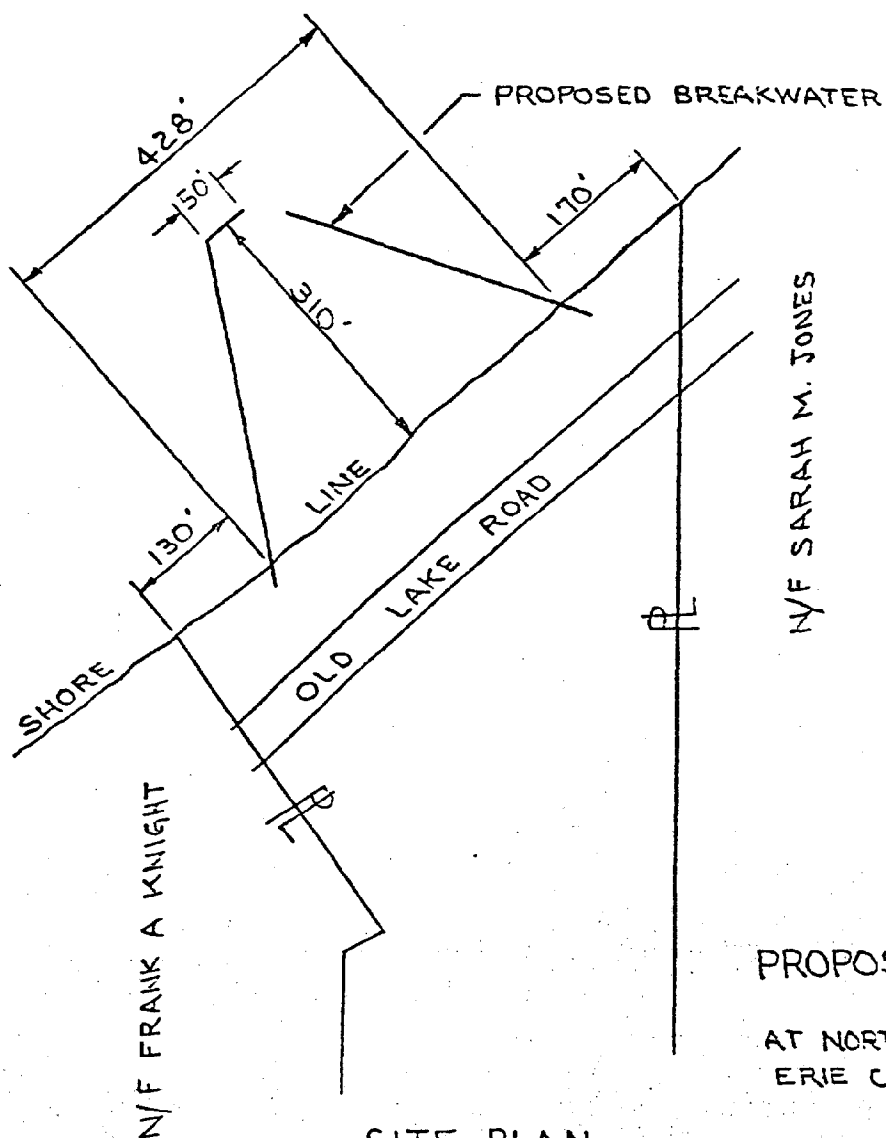
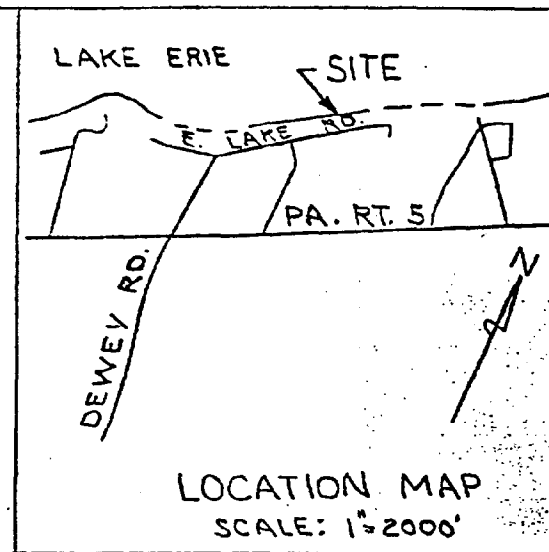


TYPICAL CROSS SECTION  
SCALE:  $\frac{1}{8}'' = 1'-0''$

PROPOSED BREAKWATER  
IN LAKE ERIE  
AT NORTH EAST ACCESS AREA  
ERIE COUNTY, PENNSYLVANIA

PLAN 2

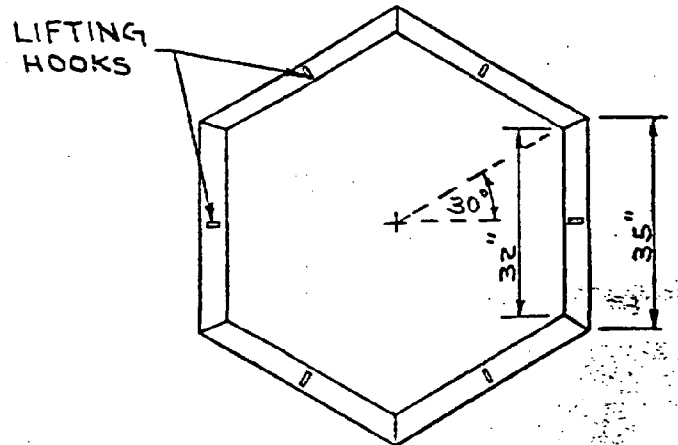




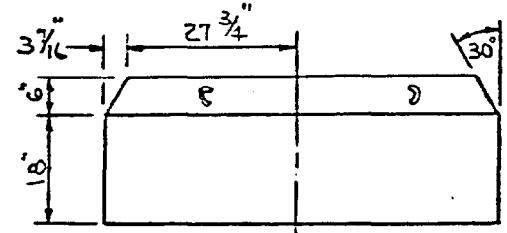
SITE PLAN  
SCALE: 1"=200'

PROPOSED BREAKWATER  
IN LAKE ERIE  
AT NORTH EAST ACCESS AREA  
ERIE COUNTY, PENNSYLVANIA

PLAN 3



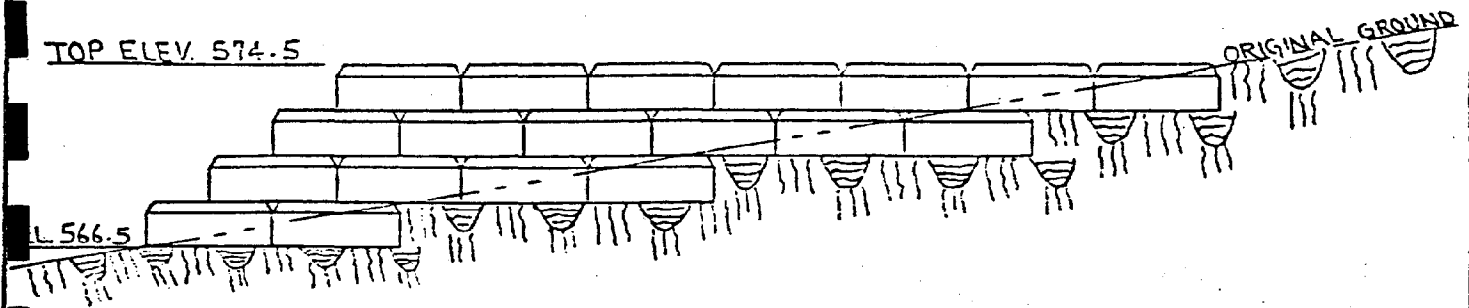
PLAN



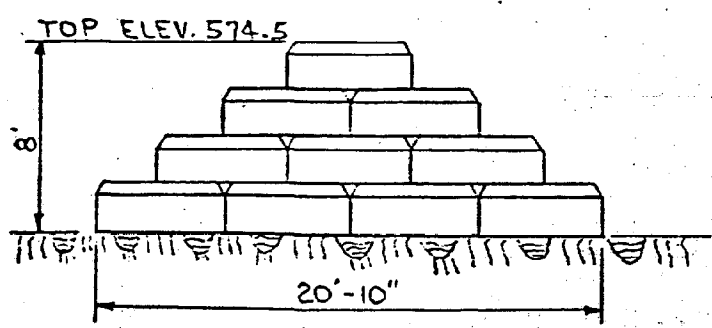
ELEVATION

SHORE PROTECTION BLOCK  
SCALE: 3/8" = 1'-0"

Note: All elevations indicated are at  
USC & GS.



ELEVATION OF BREAKWATER  
SCALE: NONE



TYPICAL CROSS SECTION  
SCALE: 1/8" = 1'-0"

PROPOSED BREAKWATER  
IN LAKE ERIE  
AT NORTH EAST ACCESS AREA  
ERIE COUNTY, PENNSYLVANIA

PLAN 3



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL RESOURCES  
Post Office Box 1467  
Harrisburg, Pennsylvania 17120  
March 14, 1983



(717) 783-9500

In reply refer to  
RM-WR  
CZ1:C3FC

Richard Malfinger, Project Engineer  
Pennsylvania Fish Commission  
Robinson Lane  
Bellefonte, PA 16823

Dear Mr. Malfinger:

As you requested in your phone call of March 9, I am enclosing two reports which may assist you in completing the North East Access Area Project. The first report, "A Geotechnical Investigation of the Coastal Bluffs of Erie County, Pennsylvania", is contained in two volumes and is being sent under two separate covers. This report is an update of Paul Knuth's original "Shoreline Erosion and Flooding - Erie County" study which was used to designate bluff setback distance according to recession rates in each township. Owing to the more recent data contained in the study update, our limited supply of the original Erie County "Coastal Flooding" report, and the fact that the updated study examines smaller study areas (70 sites in all), I think it will be much more useful to you.

A copy of the Corps' "Low Cost Shore Protection-Guide for Engineers and Contractors" is also being sent to you. This report contains valuable information on the effectiveness of various shore protection structures along bluff-type shorelines.

Finally, you should also be aware that our office is developing a predictive model for the placement of shoreline stabilization structures, i.e., groins and jetties. This computer model will graphically display the changes a shoreline will go through over time following the placement of a stabilization structure. Since this model is not fully operational, I cannot send you report materials; however, we may wish to run a test of your preliminary design for a harbor/shoreline protection structure using this model when your study nears completion. Please let me know when your design plans will be finalized so we may set up a test run.

I look forward to working with you on the project in the future.

Sincerely,

DEIRDRE C. TAYLOR  
Project Support Specialist  
Division of Coastal Zone Management

Enclosure



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
**ENVIRONMENTAL RESEARCH LABORATORIES**

Great Lakes Environmental Research Laboratory  
2300 Washtenaw Ave.  
Ann Arbor, MI. 48104

March 3, 1983

Mr. Richard Mulfinger  
Pennsylvania Fish Commission  
Robinson Lane  
Bellefonte, PA. 16823

Dear Mr. Mulfinger:

In response to your request for wave information in Lake Erie, I am enclosing a copy of two tables of wave height and wave period distribution in Lake Erie. I hope these will be useful to you. Please let me know if you need further information.

Sincerely,

  
Paul C. Liu  
Oceanographer

Encl..



## LAKE ERIE WAVE STATISTICS♦

SIGNIFICANT WAVE HEIGHT RANGE (METER)	PERCENTAGE OF OCCURRENCE
0.0 - .3	31.9
.3 - .7	25.4
.7 - 1.0	24.6
1.0 - 1.3	10.0
1.3 - 1.7	4.7
1.7 - 2.0	2.6
2.0 - 2.3	.7
2.3 - 2.7	.1
2.7 - 3.0	0.0

---

PEAK ENERGY WAVE PERIOD RANGE (SECOND)	PERCENTAGE OF OCCURRENCE
0.0 - 1.0	2.8
1.0 - 2.0	.6
2.0 - 3.0	39.9
3.0 - 4.0	32.3
4.0 - 5.0	20.5
5.0 - 6.0	3.3
6.0 - 7.0	.5
7.0 - 8.0	.1
8.0 - 9.0	0.0

---

♦BASED ON 5977 HOURS OF RECORDING DURING APRIL-DECEMBER, 1981  
FROM NOAA-NDBO BUOY #45005 LOCATED AT 41.7N, 82.5W.

### CONCLUSIONS

The committee made the following conclusions on the launch ramps:

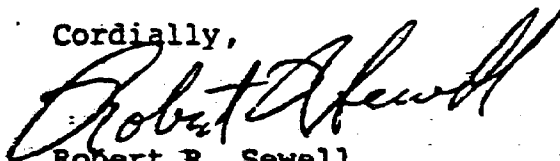
1. There is only one (1) first class launch ramp along the Pennsylvania section of Lake Erie - Walnut Creek.
2. There are two ramps that need immediate work to accommodate the additional growth and safety - East Avenue Ramp  
Marina Ramp
3. Thought should be given to boat refuge/launch ramps on both the east and west sides of Erie County.
4. Improvement plans should be developed and implemented for -  
Niagara Ramp  
Cascade Ramp  
Chestnut Street Ramp
5. Feasibility studies should be made for the Lagoons Ramp.
6. On all future improvements for launch ramps, piers or docks should be incorporated as part of the design - one common dock for every 2 ramp lanes. Something similar to that being used at the public ramps in Manistee and Luddington, Michigan.

The Launch Ramp Facility Study Committee submits the "Ramp Study Report" of the twelve public ramps on Lake Erie for your consideration.

These individual ramp studies are intended to acquaint you with the general conditions as they now exist. As each of these studies was made, we attempted to talk to boaters that were using that ramp.

Please do not hesitate to contact us if there are any other questions.

Cordially,



Robert R. Sewell  
Ramp Chairman  
Erie Downriggers

Banks Whitman  
John Grode  
Chet Aleks  
Roy Tenny  
Ted Hallgren  
George Simon

